

**Research Article**

## **Comparison of ondansetron & dexamethasone in prevention of postoperative nausea & vomiting in laparoscopic surgery**

Vrinda Oza<sup>\*</sup>, Srinivasa S, Abhijeet Ingle, Jigisha Badheka and V.A. Chhaya

*Department of Anaesthesiology, P.D.U. Govt. Medical College, Rajkot, Gujarat-360001 India*

**\*Correspondence Info:**

Dr. Vrinda Oza,

F/201, Sadguruvatika, Marutinagar-2,

Airport Road, Rajkot-360001, Gujarat, India.

E-mail: [vrindaagravati@gmail.com](mailto:vrindaagravati@gmail.com)

**Abstract**

**Objectives:** Incidence of post-operative nausea and vomiting (PONV) is high in patients undergoing laparoscopic surgeries under general anaesthesia. Aim of this study is to compare dexamethasone and ondansetron in preventing PONV.

**Methods:** In this randomized, open clinical trial, we studied 100 ASA Grades I, II and III patients between the ages of 20 and 60 years undergoing elective laparoscopic surgeries under general anaesthesia. Group I received 4 mg of ondansetron i.v. and group II received 8 mg of dexamethasone i.v. 5 minutes before the induction of anaesthesia. The incidences of PONV were recorded with in the first 24 hours after surgery at intervals of 0-2 hours, 2-6 hours and 6-24 hours.

**Results and conclusion:** Nausea in the first two hours of post-operative period was significantly more in Group D as compared with Group O. In the 2 - 6 hour period and 6 - 24 hours period nausea was present in both the Groups and was statistically insignificant. There was no statistically significant difference between both the groups in incidence of vomiting and PONV in postoperative period. Incidence of PONV is not related to increase BMI, phases of menstrual and inhalational anaesthetic agent used. We conclude that ondansetron given intravenously just before induction is safe and more effective than intravenous dexamethasone in early nausea and vomiting and dexamethasone reduces delayed post-operative nausea and vomiting in patients undergoing elective laparoscopic surgeries.

**Keywords:** PONV, laparoscopic surgery, general anaesthesia

### **1. Introduction**

The most common and distressing symptoms following surgery and anaesthesia are pain, nausea and vomiting. Pain causes suffering and draws first attention. Sometimes nausea and vomiting may be more distressing especially after minor and ambulatory surgery, delaying hospital discharge.<sup>1</sup>The incidence of PONV after anaesthesia, despite advances in antiemetic therapy in the last decades is still found to be relatively high and the incidence is 20-40%.<sup>1</sup> Numerous factors can affect PONV, such as age, gender, obesity, history of motion sickness and / or PONV, use of opioids, anaesthetic technique, duration and type of the surgical procedure and postoperative pain. Female patients experience PONV more often and it is more severe than that experienced by male patients.<sup>2</sup> Moreover the phases of the menstrual cycle influences the incidence of PONV.<sup>3</sup> Incidence of post-operative nausea and vomiting is high in patients undergoing laparoscopic surgeries under general anaesthesia. Many drugs have been used to prevent nausea and vomiting either alone or in different combinations. The aim of this study is to compare the efficacy of dexamethasone with ondansetron in preventing PONV in laparoscopic surgeries under general anaesthesia, with respect to 1. Early vomiting, 2. Delayed vomiting, 3 PONV in relation to inhalational agent used. 4. PONV in relation to phases of menstrual cycle and 5. Requirement of rescue antiemetic

### **2. Materials and Methods**

This clinical study consisting of 100 adult patients posted to undergo elective surgeries was undertaken at P.D.U. Medical College, Rajkot during the period of June 2010- August 2011. In this randomized, open clinical trial, we studied 100 ASA Grades I, II and III patients between the ages of 20 and 60 years undergoing elective laparoscopic surgeries under general anaesthesia. Approval was taken from the ethical committee (Ethical committee approval no. **PDUMCR/IEC/13/2010**, dated 29/06/2010) and written informed consent was taken from all the patients. They were randomly divided into two groups, Group I and Group II, each consisting of 50 patients. Group I received 4 mg of ondansetron i.v. and group II received 8 mg of dexamethasone i.v. 5 minutes before the induction of anaesthesia. Patients belonging to ASA grade III and IV, pregnant and lactating women, history of motion sickness, preoperative nausea and vomiting, diabetes mellitus, intestinal obstruction, hiatus hernia, renal, hepatic disease, received antiemetic within 24 hrs of surgery and scheduled to have nasogastric tube in situ after surgery were excluded from the study. Preoperative visit was conducted on the previous day of surgery and a detailed history and present complaints were noted. General and systemic examinations of cardiovascular, respiratory and central nervous system were done. Routine laboratory investigations like complete haemogram, blood urea, serum creatinine, and blood sugar, ECG, chest X – ray PA view were done. Patients were instructed to remain nil orally after 10PM on the previous night of surgery. General anaesthesia with controlled ventilation was used in all patients. Preoperative pulse rate, blood pressure and peripheral oxygen saturation were recorded in the operation theatre after attaching ECG, NIBP and pulse oximeter.

Peripheral venous access was established with 20G intra venous cannula and intravenous fluid was started with dextrose normal saline. The study medications were administered intravenously just 5 minutes before induction along with premedication with Inj. glycopyrrolate 0.004 mg/kg, inj, ranitidine 1 mg/kg, midazolam 0.01mg/kg and inj. fentanyl 0.5 mcg/kg/hour i.v. Patients were pre-oxygenated for 3 minutes before induction of anaesthesia with 100% oxygen and induction was done with Inj. thiopentone sodium 5 mg/kg. Inj. succinylcholine 1.5 mg/kg was used as muscle relaxant for intubation. Intubation was done with appropriate size endotracheal tube, bilateral air entry checked by auscultation and endotracheal tube was fixed. EtCO<sub>2</sub> monitoring was done

after intubation. Maintenance of anaesthesia was with nitrous oxide (50%) and oxygen (50%) with halothane /isoflurane/sevoflurane and Inj. vecuronium 0.08 mg/kg i.v. was used to provide muscle relaxation during surgery using controlled ventilation through closed circuit. Patients were monitored during anaesthesia using continuous ECG, heart rate, blood pressure, EtCO<sub>2</sub> and pulse oximetry. On completion of surgery, the residual paralysis was reversed with Inj. glycopyrrolate 0.008 mg/kg i.v. and Inj. neostigmine 0.05 mg/kg i.v. Extubation of trachea was done after adequate oral suctioning and criteria for extubation were fulfilled. Inj. diclofenac sodium 1.5 mg/kg i.v. was given for post-operative analgesia. Patients were transported to the recovery room and later to the ward after confirming an adequate level of consciousness and intact reflexes. The incidences of PONV were recorded with in the first 24 hours after surgery at intervals of 0-2 hours, 2- 6 hours and 6-24 hours. Episodes of PONV were identified by spontaneous complaints by the patients or by direct questioning.

#### PONV SCORE:

0- No nausea, vomiting

1- Nausea alone

1- Persistent nausea

2 - Vomiting once

3 - Vomiting two or more times in thirty minutes

RESCUE ANTIEMETIC TO BE GIVEN WHEN PONV SCORE >2 OR PERSISTENT NAUSEA (>30 minutes)

#### PATIENT SATISFACTION SCORE:

1 – Very Satisfied

2 – Quite Satisfied

3 – Neither satisfied nor unsatisfied

4 – Rather Unsatisfied

5 – Very Unsatisfied

“Complete response” was defined as the absence of nausea, retching or vomiting and no need for rescue antiemetic during the 24-hour observation period. Rescue antiemetic was provided with Inj. metoclopramide 10mg i.v in the event of 1 or more episodes of vomiting or persistent nausea (>30 minutes) .

### 3. Results

**Table 1: Demographic Characteristics**

	Group D (Mean ±SD)	Group O (Mean ±SD)	P-value
Age (years)	37.24±11.15	35.66±11.74	>0.05
Weight (Kg)	55.56±7.87	55.72±7.89	>0.05
Height (cm)	156±3.7	157±4.0	>0.05
BMI (Kg/m <sup>2</sup> )	22.83±3.4	22.60±2.94	>0.05
Duration of surgery (min)	97±12	102±9	>0.05

**Table 2: PONV in relation to Phases of Menstrual cycle and inhalational agent**

	Group D (%)	Group O (%)	P- Value
PONV in relation to phase of menstrual cycle			
Follicular Phase	76.19	54.55	>0.05
Luteal Phase	35.29	40	>0.05
Menstrual Phase	58.33	25	>0.05
Inhalational agent			
Halothane	50	33	>0.05
Isoflurane	38	33	>0.05
Sevoflurane	56	9	>0.05

**Table 3: Incidence of PONV**

	Group D (%)	Group O (%)	P- Value
Incidence of Nausea			
0-2 hrs	22	6	<0.05*
2-6 hrs	8	6	>0.05
6-24 hrs	4	8	>0.05
Incidence of Vomiting			
0-2 hrs	16	2	>0.05
2-6 hrs	4	0	#
6-24 hrs	6	5	>0.05
Incidence of PONV	60	34	>0.05
Rescue antiemetic	40	18	>0.05

Patient characteristics did not differ between the two groups (Table 1) in relation to age, weight, height, BMI and duration of surgery.

On comparing female patients in group D and group O (Table 2) for PONV in relation to follicular, luteal and menstrual phase of menstrual cycle showed that the difference was statistically insignificant.

On comparing patients in group D and group O (Table 2) for PONV in relation to inhalational agents halothane, isoflurane and sevoflurane showed that the analysis was statistically insignificant.

In Group D, out of 50 patients 11 patients (22%) experienced nausea, while in Group O, 3 patients (6%) out of 50 experienced nausea in the first two hours of postoperative period. This analysis was found to be statistically significant. In the 2-6 hours period 4 patients (8%) out of 50 experienced nausea in Group D and 3 of the patients out of 50 experienced nausea in Group O; in the 6-24 hours period 2 patients (4%) out of 50 in Group D experienced nausea while 3 patients (6%) out of 50 in the 6-24 hours period experienced nausea in Group O. This analysis was found to be statistically non-significant.

In Group D, 8 patients (16%) out of 50 experienced vomiting, while in Group O, 2 patients (4%) out of 50 experienced vomiting in the first two hours of postoperative period. This analysis was found to be statistically significant. In the 2-6 hours period 2 patients (4%) out of 50 experienced vomiting in Group D and none of the patients out of 50 experienced vomiting in Group O; in the 6- 24 hours period 3 patients (6%) out of 50 in Group D experienced

vomiting while 5 patients (10%) out of 50 in the 6-24 hours period experienced vomiting in Group O. This analysis was found to be statistically non-significant.

In Group D, 30 patients (60%) out of 50 experienced PONV, while in Group O, 17 patients (34%) out of 50 experienced PONV in the first twenty four hours of post-operative period. This analysis was found to be statistically significant. The total number of patients suffering from PONV is 47 out of 100 patients.

In Group D, 30 patients (60%) out of 50 experienced PONV and only 12 (60%) patients out of 30 required rescue-antiemetics while 18 patients (40%) who experienced PONV did not require rescue-antiemetics.

In Group O, 17 patients (34%) out of 50 experienced PONV and only 3 patients (18%) required rescue-antiemetics while 14 patients (88%) who experienced PONV did not require rescue-antiemetics. This analysis was found to be statistically insignificant.

#### 4. Discussion

Postoperative nausea and vomiting (PONV) is of multifactorial origin. Three most common causes for admission following day care surgery are pain, bleeding and intractable vomiting. This can delay discharge and result in unplanned overnight hospital admission. In fact, its contribution to patient dissatisfaction is such that over 70% of patients considered avoidance of PONV to be very important<sup>4</sup>.

Anxiety increases the incidence of PONV.<sup>5</sup> In our study anxiolysis was provided with Inj. midazolam 0.05 mg/kg i.v. as premedication. Lack of control group (placebo) in our study is a drawback. However, conducting a surgery with a high incidence of PONV, without any prophylactic antiemetic was not acceptable. Laparoscopic surgeries were taken in the study as it is an independent predictor of PONV.<sup>6</sup>

In our study the incidence of PONV is not related to increase BMI as also seen in study by Kranke *et al*<sup>7</sup>. There was no relationship between incidence of PONV and phases of menstrual cycle in our study and is supported by studies done by Panditrao *et al*<sup>8</sup> and Irwin *et al*<sup>9</sup>. There is no difference between the three inhalation anaesthetics currently used with regard to frequency or severity of postoperative nausea, vomiting, or both also seen by Wallenborn.<sup>10</sup> Prolonged duration of surgery is an independent risk factor for PONV.<sup>6</sup>

Nausea in the first two hours of post-operative period was significantly more in Group D as compared with Group O. In the 2 – 6 hour period and 6 – 24 hours period nausea was present in both the Groups and was statistically insignificant. Similar findings were seen in study done by Gautam B<sup>11</sup>. There was no statistically significant difference between both the groups in incidence of vomiting and PONV in postoperative period as also seen in studies by Thomas and Jones<sup>12</sup>

Mehernoor *et al*<sup>13</sup> suggested that, administering a repeat dose of same antiemetic to patients who have already received a prophylactic dose, fails to control established PONV. So an antiemetic from a different<sup>14</sup> pharmacological, Metoclopramide 10mg was used as rescue antiemetic in our study.

Updated guidelines<sup>14</sup> for managing postoperative nausea and vomiting were announced at the 2006 Annual Meeting of the American Society of Anaesthesiologists in Chicago, Illinois, USA. Evaluating the current medical literature, they recommended the use of antiemetic, with an emphasis on the use of the 5HT3 receptor antagonists. The guidelines also suggest a potential benefit of combination prophylaxis. Overall the panel recommended prophylactic therapy with combination, three or more interventions, in patients at high risk for PONV group should be used as rescue antiemetic.

#### 5. Conclusion

PONV is one of the most distressing side-effects of anaesthesia and surgery with a high incidence following general anaesthesia. The quest for more effective antiemetic drugs without the potential for sedative or extrapyramidal side-effects has led to the development of a relatively new class of drugs, 5-HT3 antagonists of which ondansetron is a prototype.

We conclude that ondansetron given intravenously just before induction is safe and more effective than intravenous dexamethasone in early nausea and vomiting and dexamethasone reduces delayed post-operative nausea and vomiting in patients undergoing elective laparoscopic surgeries under general anaesthesia. There was no relationship between incidence of PONV and phases of menstrual cycle and inhalational agents used.

#### References

- Islam S, Jain PN. Post-operative nausea and vomiting (PONV): A review article. *Indian J. Anaesth.* 2004; 48(4):253-8.
- Watcha MF, White PF. Post-operative nausea and vomiting: Its etiology, treatment and prevention. *Anaesthesiology.* 1992; 77:162-84.
- Beattie WS, Lindblad T, Buckley DN, Forrest JB. Menstruation increases the risk of nausea and vomiting after laparoscopy. A prospective randomized study. *Anaesthesiology.* 1993; 78:272-6.
- Gan T, Sloan F, Dear Gde L, El-Moalem HE, Lubarsky DA. How much are patients willing to pay to avoid postoperative nausea and vomiting? *Anesth Analg.* 2001; 92(2):393-400.
- Van den Bosch JE, Moons KG, Bonsel GJ, Kalkman CJ. Does measurement of preoperative anxiety have added value for predicting postoperative nausea and vomiting? *Anesth Analg.* 2005;100(5):1525-32
- Miller RD. *Miller's Anaesthesia* 7<sup>th</sup> ed. Philadelphia: Churchill Livingstone; 2010.
- Kranke P, Apfel CC, Papenfuss T, Rauch S, Lo Bmann U, Ru Bsam B *et al.* An increased body mass index is no risk factor for Post-operative nausea and vomiting. A systematic review and results of original data. *Acta Anaesthesiol Scand.* 2001; 45: 160–6.
- Panditrao AM, Panditrao MM, Panditrao MM, Azher I. A prospective study to compare the incidence of post-operative nausea, vomiting (PONV) in female patients undergoing surgical procedures under general anaesthesia during proliferative and secretory phase of menstrual cycle. *International Journal of Student's Research.* 2011;1(1)
- Gratz I, Allen E, Afshar M, Joslyn AF, Buxbaum J, Prilliman B. The effects of the menstrual cycle on the incidence of emesis and efficacy of ondansetron. *Anesth Analg.* 1996; 83:565-9.
- Wallenborn J, Rudolph C, Gelbrich G, Goerlich TM, Helm J, Olthoff D. The impact of isoflurane, desflurane, or sevoflurane on the frequency and severity of postoperative nausea and vomiting after lumbar disc surgery. *J Clin Anesth.* 2007; 19(3):180-5.
- Gautam B, Shrestha BR, Lama P, Rai S. Antiemetic prophylaxis against postoperative nausea and vomiting with ondansetron-dexamethasone combination compared to ondansetron or dexamethasone alone for patients undergoing laparoscopic cholecystectomy. *Kathmandu Univ Med J.* 2008; 6(23):319-28.
- Thomas R, Jones N. Prospective randomized, double blind comparative study of dexamethasone, ondansetron, and ondansetron plus dexamethasone as prophylactic antiemetic therapy in patients undergoing day care gynaecological surgery. *Br. J. Anaesth* 2001; 87(4):588-92
- Mehernoor F, Watcha, Paul F. White., Post-operative nausea and vomiting, its aetiology, treatment and prevention. *Anaesthesiology* 1992; 77:162-84.
- Gan TJ, Meyer TA, Apfel CC, Chung F, Davis PJ, Habib AS *et al.* Society for Ambulatory Anesthesia Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesth Analg* 2007; 105(6):1615–28.