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# Comparsion of Palonsteron, Ondansetron and Dexamethasone in Reduction of Post Operative Nausea and Vomiting Following Laparoscopic Cholecystectomy.

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## ABSTRACT

**Background:** The aim of the study is to compare efficacy of intravenous (i/v) Palonosetron (75mcg), i/v Ondansetron (4mg) and i/v Dexamethasone (5mg) as prophylactic agents for reducing post-operative nausea and vomiting that follows laparoscopic cholecystectomy. **Methods:** This prospective randomized double blind study was conducted in the Department of Anaesthesia and Critical Care, Tata Main Hospital, Jamshedpur. The study participants comprised of patients undergoing elective laparoscopic cholecystectomy surgeries under general anaesthesia. A total of 90 patients i.e. 30 in each of the three groups were enrolled for the study. Enrolled patients were randomly allocated to received with i/v Dexamethasone (5 mg) or i/v Ondansetron (4mg) or i/v Palonosetron (0.075 mg). The patients in the three groups were monitored and symptoms charted on basis of Post Operative Nausea and Vomiting (PONV) scale. **Results:** Palonosetron 0.075mg single intravenous dose given prior to induction of anaesthesia achieves 100% complete response with 3.33% reported side effect, and none needed rescue antiemetic. Dexamethasone 5mg single intravenous dose given prior to induction of anaesthesia achieves 93.33 % complete response with none reporting side effect and 6.67% needing rescue antiemetic. Ondansetron 4mg single intravenous dose given prior to reversal of neuromuscular blockade achieves 66.67 % complete response with 20% reporting side effect and 33.33 % needing rescue antiemetic. **Conclusion:** I.V. Palonosetron and Dexamethasone are equally potent and superior antiemetics than Ondansetron in the prevention of PONV in patients undergoing elective laproscopic cholecystectomy under general anaesthesia.

***Keywords:*** Palonosetron, Ondansetron, Post Operative Nausea Vomiting.

## INTRODUCTION

Post-Operative Nausea and Vomiting (PONV) remains a significant problem in modern day anesthesia practice with overall incidence of 20 to 30% and up to 80% in high risk group.[1,2] Untreated, one third patients will have postoperative nausea, vomiting, or both (PONV). Patients often rate postoperative nausea and vomiting worse than postoperative pain.[3,4] Vomiting also increases the risk of aspiration of gastric contents, is associated with suture dehiscence, oesophageal rupture, subcutaneous emphysema, pneumothorax.[5,6] PONV frequently delays discharge from post anesthesia care units, and is also the leading cause of unexpected hospital admission after planned ambulatory surgery.[7-9] It is not surprising therefore; that the prevention of postoperative nausea and vomiting not only improves patient satisfaction but also reduces potentially life threatening post-operative complications.[10]

Laparoscopic surgeries are frequently associated with post-operative nausea and vomiting (PONV). The incidence of PONV following laparoscopic cholecystectomy without any active intervention remains unacceptably high i.e., 40-70% in the first 24 hours.[11] As the incidence of post-operative nausea vomiting is unacceptably high in laparoscopic cholecystectomy prophylaxis with pharmacological agents is highly beneficial and results in early discharge from PACU and cost reduction. PONV is said to have a multi-factorial etiology. The most common suggested mechanism following laparoscopic surgery is creation of pneumo-peritoneum with carbon dioxide leads to dilatation of intestinal loops, thus stimulating the mechanoreceptors (5HT) in the gut wall which in turn leads to increased serotonin synthesis. This cascade triggers the chemoreceptor trigger zone (CTZ) in the medulla which receives vagal afferents

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from various parts of the body and evokes an emetic response (PONV).[12,13]

Recent advances in PONV prophylaxis include both non-pharmacological methods & pharmacological measures. However pharmacological agents remain the main stay in PONV management.[14] A number of pharmacological agents are available for routine prophylaxis and treatment against PONV. Among all, 5-HT3 (5-hydroxytryptamine) receptor antagonists are most commonly used. They have significantly reduced PONV incidences and complications. Ondansetron was initially developed to relieve nausea and vomiting post chemotherapy and radiotherapy treatment for malignancies.[15] It's role in PONV prophylaxis is now time proven and is being routinely used by the present day Anesthesiologists for PONV prophylaxis.[16]

After Ondansetron, other more specific 5-HT3 antagonists have been invented such as Granisetron, Dolasetron, Ramosetron and Palonosetron. Palonosetron is the most recent 5HT3 receptor antagonist and has been approved by the Food and Administration of U.S.A in 2003 for management of chemotherapy induced nausea and vomiting.[17] It has a greater receptor binding affinity and a much longer half-life, conferring a prolonged duration of action, exceeding 40 hours, compared with other 5-HT3 receptor antagonists.[18,19] In addition, Palonosetron exhibits allosteric interactions and triggers receptor internalization resulting in a long-lived inhibition of receptor function.[20] This makes it a very promising drug for PONV prophylaxis and there are various studies showing the use of in PONV.[21]

Dexamethasone is a glucocorticoid drug that has been successfully used as an adjuvant or as a sole antiemetic in patients undergoing chemotherapy.[22,23] The exact mechanism of action of Dexamethasone is not known. However there have been some suggestions such as central or peripheral inhibition of production or secretion of Serotonin, central inhibition of synthesis of Prostaglandins, or changes in the permeability of blood brain barrier to serum proteins.[24] The role of Dexamethasone in PONV prophylaxis has been proven in placebo control trials.[25] Few authors compared it with 5HT3 receptor antagonist as a sole agent reported to be equal or better.[26,27] Some studies reported Dexamethasone is more effective in combination with 5HT3 receptor antagonist rather than as a sole agent.[28,29]

Out of the above mention drugs for PONV prophylaxis, Ondansetron is the frequently used drug; Dexamethasone is sometimes used as a sole agent or in combination. Palonosetron is the latest drug with promising prospect. Literature is full with studies comparing Ondansetron with Dexamethasone, Ondansetron with Palonosetron. No study has compared Dexamethasone with Palonosetron as a single agent for PONV prophylaxis. Most studies had compared Dexamethasone in combination with Palonosetron versus or Dexamethasone alone. There is no study which has compared all three drugs as single agents, and the search for a single optimal antiemetic agent in PONV prophylaxis is still elusive. With this background, the current study was undertaken with the aim to compare efficacy of intravenous (i/v) Palonosetron (75mcg), i/v Ondansetron (4mg) and i/v Dexamethasone (5mg) as prophylactic agents for reducing post-operative nausea and vomiting that follows laparoscopic cholecystectomy.

## MATERIALS AND METHODS

The current study was conducted with the aim to compare i/v Palonosetron (0.075mg), i/v Ondansetron (4mg) and i/v Dexamethasone (5mg) as a prophylactic agent in reducing the post-operative nausea and vomiting following laparoscopic cholecystectomy surgery.

**Primary Outcome Measure:**

Proportion of patients with complete response—CR (no emetic episodes and therefore did not require rescue anti emetics in 0-24 hours post- operatively).

**Secondary Outcome Measures:**

Proportion of patients who had PONV (based on PONV Scale) thus needing rescue antiemetics during different time periods: i.e. 0-6 hours, 6-12 hours, 12-24 hours.

The occurrence of any side effects like headache, dizziness, drowsiness constipation etc.

**Study design, setting and population:**

This prospective randomized double blind study was was conducted in the main Operation Theatre, Department of Anaesthesia and Critical Care, Tata Main Hospital, Jamshedpur. The study participants comprised of patients undergoing elective laparoscopic cholecystectomy surgeries under general anaesthesia.

**Study period:** January 2015 to October 2015

**Sample Size and sample technique:** A total of 90 patients i.e. 30 in each of the three groups were considered for the study, taking β error of 5% and desired power of study as 80%.

**Sample technique:** Simple random sampling technique was used, so that every sampling unit got an equal chance of being included in it.

Randomization: The randomization list was generated by a random number function using the Microsoft Excel 2010 spreadsheet, resulting in a list of 90 patients and which were labeled randomly by computer into group I, II, III.

**Grouping:** Total no. of 90 patients were included in the study and randomly divided into three groups with 30 patients each

**Group I (n=30):** I.V. Dexamethasone 5 mg

**Group II (n=30):** I.V Ondansetron4 mg
**Group III (n=30):** I.V Palonosetron 0.075 mg
**Blinding:** This study was conducted as a double blind study. Identical looking coded syringe were prepared by an anesthesiologist not involved in the study. The drug administrator and the person making the observations were blinded to the study.

**Method of allocation concealment:**
Sequentially numbered, sealed, opaque envelopes

**Inclusion Criteria:**

- Patients aged between 20 to 60 years.
- Patients with physical status ASA I and II.
- Patients scheduled for elective laparoscopic cholecystectomy surgeries under general anesthesia.

**Exclusion Criteria:**

- Patients with physical status ASA III and IV.
- Patients who have received Opioids, Non Steroidal Anti Inflamatory Drugs or Antiemetic agents 48 hours before surgery.
- Patients with history of allergic reaction to any drug or food.
- History of Motion sickness or migraine.
- History of smoking, alcohol or drug abuse.
- Patients in whose laproscopic surgery were converted to open cholecystectomy.
- Pregnant or lactating females.

**Preoperative Assessment:**
Following the approval of Ethics committee of Tata Main Hospital Jamshedpur, Jharkhand, patients presenting for elective laparoscopic cholecystectomy were randomly selected into one of the three groups of 30 patients each by a computer generated randomization table. All patients were explained about the anesthesia technique and written informed consent was obtained. All patients were also explained about nausea, vomiting, retching and explained regarding informing these to the investigator. In the pre operative visit physical and systemic examination, air way assessment along with all necessary investigations was done.

**Anaesthesia during surgery:**
Operating room preparation: In the operation theatre monitors for Electro Cardio Gram (ECG), Non invasive blood pressure (NIBP) and Pulse Oxymeter (SPO2) were connected, and base line readings obtained. An intra venous line was secured and IV fluids Ringer lactate started at rate of 3ml/kg to 5ml/kg and maintained throughout the surgery. All drugs were prepared in 5ml Syringe and dilute in 5ml of Normal saline for blinding. In Group I and III prophylactic study drug was given 5 minutes before induction of general anaesthesia. In Group II the prophylactic study drug was given 5 minutes before reversal of neuromuscular blockade.[30-32]
**Induction:** All the patients were pre oxygenated with 100% oxygen for 5 minutes. Induction was accomplished by (2.5% ) I.V Thiopentone Sodium 5mg/kg and I.V Fentanyl 2mcg/kg followed by I.V Vecuronium 0.08mg/kg to facilitate with endotracheal intubation.
**Maintenance:** Patients were mechanically ventilated with a tidal volume of 6-8ml /kg. Inspiration: Expiration (I: E) ratio of 1:2, and respiratory rate (RR) of 10 to12 breaths per minute were used to maintain End Tidal CO2 levels of 30 to 35 mmHg throughout the operation. Anesthesia was maintained with Isoflurane (0.6 to 1%) N2O and Oxygen. Muscle relaxation was maintained with initial doses of I.V Vecuronium (0.05mg /kg) and subsequent doses of 0.01mg/kg. ECG, SPO2 were monitored continuously and NIBP measured in every five minutes interval till the end of surgery.
Total duration of surgery was noted because of its possible impact on PONV. Intra operatively Carbon Dioxide Insufflation Pressure was recorded; it was maintained between 10-12 mm Hg.
**Reversal:** The neuromuscular blocked was reversed with injection Atropine 0.02mg/kg and Neostigmine 0.05mg/kg. Extubation was done after thorough oral suctioning and nasogastric tube suctioning. The nasogastric tube was then removed.
**Post-operative period:** Post operatively patients were given Inj. Paracetamol 1gm IV 8 hourly and Inj. Diclofenac Sodium 75 mg I.M. 8 hourly for pain relief for 24 hours as per hospital pain management strategy. Patients were monitored for the incidence of nausea, retching, vomiting (on the basis of Post Operative Nausea and Vomiting scale) and the need of rescue medication during 24 hours following surgery was recorded (divided into three time periods of 0 to 6 hours, 6 to 12 hours and 12 to 24 hours post operatively).
The patients in the three groups were monitored and symptoms charted on basis of Post Operative Nausea and Vomiting (PONV) scale for the following: 33
0 = None
1 = Nausea
2 = Retching
3 = Vomiting
4 = Severe Vomiting (> 4 episodes)
Primary antiemetic efficacy variables were the incidence and severity of nausea, the frequency of emetic episodes during the first 24 h after surgery, and the need to use a rescue antiemetic medication.
Operational definitions used:

Nausea was defined as a subjective desire to vomit, but without expulsive muscular movements.
Retching was defined as an expulsive movement of the stomach muscles without expulsion of stomach contents;
Nausea, retching and vomiting was considered to be an emetic episode.

**Statistical Analysis**
The collected data were organized, tabulated and statistically analysis using "MedCalc". Numerical data were expressed as mean ± standard deviation,

and categorical data were expressed as relative frequency and percentage. T-test was used to compare two independent groups of continuous data. Chi-square test was used to compare categorical data. A "p-value" of <0.05 was considered statistically significant.

## RESULTS

**Baseline characteristics of the study participants**

The mean (SD) age of the participants was 43.5 (8.9), 43.7 (9.4) and 42.8 (11.3) years in each of the three groups respectively (Table 1). The difference was not statistically significant (P=0.93). Similarly, there was no significant difference among the three groups in terms of the distribution of the sex of the participants (P=0.31). While 93.3% were females in group 1, the proportion was 80.0% and 83.3% in groups 2 and 3 respectively. The mean (SD) body weight (in Kg) of the participants in group 1, 2 and 3 was 62.03 (7.9), 61.27 (7.8) and 61.97 (7.8) respectively. There was no statistically significant difference in mean body weight among the three groups [Table 1] (P=0.08).

**Clinical characteristics**

The mean (SD) duration of the surgery was statistically similar across the three groups (P>0.05) [Table 2]. The duration of surgery was 76.6 (12.7) min in group 1; 83.4 (14.5) min in group 2 and 79.9 (12.5) min in group 3. The systolic and diastolic blood pressure as well as heart rate was statistically similar across the three groups at 6, 12 and 24 hours post surgery [Table 2]. The distribution of participants according to the ASA grade was similar (P=0.95). In group 1, 46.7% were in grade 1 and 53.3% were in grade 2. In group 2, 50% each were in grade 1 and 2 whereas in group 3, 46.7% were in grade 1 and 53.3% were in grade 2 [Table 2].

Based on post-operative nausea and vomiting scale (PONV), none of the participants reported any symptoms in group 1 within 0 to 6 hours, post-operatively [Table 3]. In group 2, 3.3% reported nausea, 6.7% reported retching and another 3.3% reported vomiting. In group 3, similar to group 1, none of the participants reported any symptom. These differences in proportions were not statistically significant (P=0.21) [Table 3].

Based on post-operative nausea and vomiting scale (PONV) administered 6 to 12 hours post-operatively, none of the participants reported any symptoms in group 1 (Table 3). In group 2, 3.3% reported nausea, 3.3% reported retching. In group 3, similar to group 1, none of the participants reported any symptom. These differences in proportions were not statistically significant (P=0.39). In the post-operative period of 12 to 24 hours, 6.67% participants in group1 reported nausea; 3.3% reported nausea, 10% reported retching and 3.3% reported vomiting in group 2 and none of the participants in group 3 reported any symptom (P=0.11) [Table 3].

When assessed for need of rescue anti-emetic, only 2 (6.67%) participants in group 1 required in 12-24 hours, post-operatively [Table 4]. In group 2, 4 (13.3%) required in 0-6 hours period; 2 (6.67%) required in 6-12 hours period and 4 (13.3%) required in 12-24 hours period [Table 4]. None of the participants in group 3 required rescue anti-emetic (P=0.24). None of the participants in group 1 reported any side effects, whereas 20% in group 2 and 3.3% in group 3 reported side effects (P=0.08).

There was a statistically significant difference in the rates on complete response among the three groups, in the period of 0-24 hours post-operatively. In group 1, it was 93.3%; in group 2, it was 66.67% and in group 3, it was 100% (P=0.0003) [Table 5]. The difference in proportions was statistically significant among group 1 and 2 (P=0.02) and between group 2 and 3 (P=0.001) but not between group 1 and 3 (P=0.47).

**Table 1: Baseline characteristics across the three groups**

| Baseline characteristics | Group I n = 30 | | Group II n = 30 | | Group III n = 30 | |
|---|---|---|---|---|---|---|
| | Total | Percentage | Total | Percentage | Total | Percentage |
| Sex | | | | | | |
| Male | 2 | 6.67% | 6 | 20% | 5 | 16.67% |
| Female | 28 | 93.33% | 24 | 80% | 25 | 83.33% |
| ASA | | | | | | |
| Grade 1 | 14 | 46.7% | 15 | 50% | 14 | 46.7% |
| Grade II | 16 | 53.3% | 15 | 50% | 16 | 53.3% |
| Age (mean ± S.D) (in years) | 43.53 ± 8.93 | | 43.73 ± 9.38 | | 42.77 ± 11.31 | |
| Weight (mean ± S.D) (In Kgs) | 62.03 ± 7.87 | | 61.27 ± 7.77 | | 61.97± 7.85 | |

**Table 2: Clinical characteristics across the three groups**

| | Group name | | | P- Value |
|---|---|---|---|---|
| | Group I | Group II | Group III | |
| Duration of surgery (minutes) | 76.6 ± 12.73 | 83.43 ±14.56 | 79.90 ±12.58 | p>0.05 |
| Systolic BP at 6 h | 130.71±10.50 | 133.61±13.43 | 134.78±12.23 | p>0.05 |
| Systolic BP at12 h | 130.57±12.37 | 131.64±14.72 | 130.07±15.18 | p>0.05 |
| Systolic BP at 24 h | 127.07 ± 8.52 | 126.5 ± 11.22 | 126 ± 11.71 | p>0.05 |
| Diastolic BP at 6 h | 80.36 ± 4.90 | 80.47 ± 9.03 | 79.4 ± 6.85 | p>0.05 |
| Diastolic BP at12 h | 79.6 ± 5.08 | 75.73± 12.33 | 76.67 ± 6.89 | p>0.05 |
| Diastolic BP at 24 h | 80.53 ± 6.72 | 76.93 ± 6.29 | 77.40 ± 5.88 | p>0.05 |

| | | | | |
|---|---|---|---|---|
| Heart rate at 6 h | 77.67 ± 10.05 | 74.87 ± 8.97 | 76.47±10.36 | p>0.05 |
| Heart rate at12 h | 76.47 ± 8.81 | 74.97 ± 9.68 | 76.7 ± 8.50 | p>0.05 |
| Heart rate at 24 h | 75.17 ± 8.80 | 74.1 ± 8.47 | 72.3 ± 8.18 | p>0.05 |

**Table 3: Post-operative nausea and vomiting (PONV) rating across the three groups**

| PONV Scale | Group I ( n = 30 ) | | Group II ( n = 30) | | Group III ( n = 30 ) | |
|---|---|---|---|---|---|---|
| | No. | Percentage | No. | Percentage | No. | Percentage |
| **0 TO 6 H** | | | | | | |
| None | 30 | 100% | 26 | 86.67% | 30 | 100% |
| Nausea | --- | | 1 | 3.33% | --- | |
| Retching | --- | | 2 | 6.67% | --- | |
| Vomiting | --- | | 1 | 3.33% | --- | |
| Severe vomiting | --- | | --- | --- | --- | |
| 6 TO 12 H | | | | | | |
| None | 30 | 100% | 28 | 93.34% | 30 | 100% |
| Nausea | --- | | 1 | 3.33% | --- | |
| Retching | --- | | 1 | 3.33% | --- | |
| Vomiting | --- | | --- | --- | --- | |
| Sever vomiting | --- | | --- | --- | --- | |
| 12 TO 24 H | | | | | | |
| None | 28 | 93.33% | 26 | 83.34% | 30 | 100% |
| Nausea | 2 | 6.67% | 1 | 3.33% | --- | |
| Retching | --- | | 2 | 10% | --- | |
| Vomiting | --- | | 1 | 3.33% | --- | |
| Sever vomiting | --- | | --- | --- | --- | |

**Table 4: Need for Rescue Antiemetic among the patients**

| Duration | Group I (n=30) | | Group II (n= 30 ) | | Group III (n=30) | |
|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No |
| 0 – 6 h | --- | 30 | 4 | 26 | --- | 30 |
| 6 – 12 h | --- | 30 | 2 | 28 | --- | 30 |
| 12 – 24 h | 2 | 28 | 4 | 26 | --- | 30 |

**Table 5: Incidence of Complete Response (CR) over 0-24 hrs among the patients**

| Duration | Group I (n=30) | | Group II (n= 30 ) | | Group III (n=30) | |
|---|---|---|---|---|---|---|
| | No. | Percentage | No. | Percentage | No. | Percentage |
| Yes | 28 | 93.33% | 20 | 66.67% | 30 | 100% |
| No | 2 | 6.67% | 10 | 33.33% | 0 | 0% |

## DISCUSSION

Laparoscopic cholecystectomy is the most commonly performed surgery for symptomatic cholelithiasis as it has drastically brought down the morbidities associated with open cholecystectomy.[34,35] However the incidence of PONV without active intervention following laparoscopic cholecystectomy remains unacceptably high (40-70%) in first 24 hours.4-5 Although much attention has been paid for the prevention of PONV during the last two decades, the optimal antiemetic regimen in the surgical setting has still not been established. The optimal antiemetic regimen would be to decrease the incidence of nausea and vomiting without increasing the risk of unacceptable adverse effects.

The present study was carried out to compare the efficacies of intravenous Palonosetron (0.075mg), Dexamethasone (5mg) and Ondansteron (4mg) to prevent PONV in patients undergoing laparoscopic cholecystectomy surgeries. In our study, the anaesthetic technique and the post operative analgesia regimen were similar for all patients. The demographic variables between the groups were comparable. The mean duration of surgery was also comparable with no statistical difference between the groups (p>0.05). Further, since the anaesthetic technique and patients factors were similar in both the groups, the incidence of PONV can be attributed to the effect and efficacy of the drugs administered.

The dose and timing of administration of Palonosetron used in the present study were based on previous studies by Kovac et al,[32] and Candiotti KA et al.[36] The dose of Dexamethasone used was decided by referring to previous studies by V K Bhartia et al and Wang Jhi-Joung,[31,37] who reported that a minimum of 5mg of Dexamethasone is required to prevent PONV during the first 24 hour of laproscopic cholecystectomy. The timing of administration of Dexamethasone in our study (five minutes before induction of anaesthesia) was also based on another study by Wang Jhi-Juong,[31] where they had concluded that prophylactic IV administration of Dexamethasone immediately before induction, rather than at the end of anaesthesia, was more effective in preventing PONV. The dose and timing of Ondansetron used was decided by referring to a previous study by Rui Sun et al30,who reported that a minimum dose of 4 mg I.V. is required to prevent PONV during otolaryngeal procedures. He also mentioned that Ondansetron should be given at the end of surgery

rather than prior to induction to be more effective in PONV prophylaxis.

In our study the incidence of PONV in Ondansetron group was 13.33%, 6.6%, 16.66% in 0-6 hours, 6-12hours, and 12-24 hours postoperatively. So the overall incidence of PONV was 33.33% (i.e. 66.67% complete response) during the 24 hours postoperative period. In Dexamethasone group the overall incidence of PONV was 6.67 % (i.e. complete response in 93.33%) in 24 hours period. In the first 12 hours of post-operative period there was no incidence of PONV in this group. In Palonosetron group not a single patient had any episode of PONV i.e.100% complete response in the 24 hours of post-operative period.

**Ondansetron versus Palonosetron**

Candiotti KA et al,[36] used 4 mg I.V. Ondansetron in a comparative study with Palonosetron 0.075 mg I.V. for PONV prophylaxis in 220 patients in laparoscopic abdominal and gynecological surgeries. He mentioned 48% incidence of PONV in Ondansetron group compared to 29.2% in Palonosetron group in the first 24 hours. Difference from our study may be due to a larger sample size in his study. Kim YY et al 38 compared I.V. Ondansetron 8 mg and Palonosetron 0.075 mg I.V. in hundred patients undergoing laparoscopic gynecological surgeries for PONV prophylaxis. The incidence of PONV was 18% and 4% in Ondansetron and Palonosetron group respectively in 72 hours period and the result was not statistically significant. In our study we had a statistically significant difference in PONV incidence (33.33% in Ondansetron versus 0% in Palonosetron with p= 0.0018) in the 24 hours post-operative period. YE Moon et al,[39] had also found that the overall incidence of PONV during 24 post operative period was lower in Palonosetron group compared to Ondansetron group (42% to 62% with p=0.045) in thyroid surgery. In summary, most of the previous studies have proven that intravenous Palonosetron is a better agent than Ondansetron for all end points during the first 24 hrs, including complete remission, emesis, nausea rates and reduction in nausea severity. This was confirmed by our study.

**Ondansetron versus Dexamethasone**

VK Bhartia et al,[37] compared I.V. Dexamethasone (5mg) and Ondansetron (4mg) in 200 patients undergoing laparoscopic cholecystectomy for preventing PONV in the 24 hours postoperative period. He concluded that Dexamethasone (36% PONV incidence) was equally effective to Ondansetron (48% PONV incidence). But in our study we found that Dexamethasone was the better drug than Ondansetron for preventing PONV (6.67% vs. 33.33% PONV incidence with p=0.0239). This difference may be due to larger sample size in pervious study. D'souza et al40 compared two doses of I.V. Dexamethasone (4mg and 8 mg) with Ondansetron (4 mg) for PONV prophylaxis in laparoscopic gynecological surgeries. The PONV incidence was lowest in 4 mg Dexamethasone group (22.6%) compared to 8 mg Dexamethasone and Ondansetron group (36.6% and 51.6%) in the first 3 hours of post operative period. In our study there was no PONV incidence in the 0-6 hour period compared to 13.33% in Ondansetron group and it goes to show that dexamethsone is better than ondansetron.

**Palonosetron versus Dexamethasone**

We were unaware of any study comparing Palonosetron and Dexamethasone as sole agents in PONV prophylaxis. Most studies had compared Dexamethasone in combination with Palonosetron versus or Dexamethasone alone.[41-43] In this respect, our study is novel and highly relevant. In our study I.V. Palonosetron with a 100% complete response (CR) proved to be equally efficacious was I.V. Dexamethasone (93.33% CR) in reducing PONV in elective laparoscopic cholecystectomy surgeries.

**Safety and side-effects**

The incidence of side effect in Dexamethasone, Ondansetron and Palonosetron was 0%, 20%, 3.33% respectively (p value =0.082). We did not encounter any major side effects except minor incidences of headache and dizziness in six patients of Ondansetron group and one patient of Palonosetron had mild headache in the postoperative period.

**Limitations of the study**

There were a few limitations in the present study. Firstly, the efficacies of I.V. Dexamethasone, Ondansetron and Palonosetron were compared based on the known optimal doses, without knowledge of equipotent doses. Secondly, the baseline incidence of PONV was not evaluated by the inclusion of a placebo group because it would be unethical to withhold prophylactic antiemetic drugs in patients at risk for PONV. Thirdly, the lower incidence of PONV might be because of small sample size, and using Non Steroidal Anti Inflammatory Drugs and not Opioids for postoperative analgesia. Fourthly, we have not measured post operative pain relief, which itself is an independent risk factor for PONV. Measuring the post operative pain relief would have given a clear incidence. Lastly, the duration of observation for PONV in our study was limited to 24 hours. A prolonged duration of observation, of more than 24 hours, would have given better insights

## CONCLUSION

In our study, we have compared the efficacy of Dexamethasone (5mg), Ondansetron (4mg) and Palonosetron (0.075mg) I.V. prophylactically in 90 patients, between age 20-60 years, of ASA grade I

and II, undergoing laproscopic cholecystectomy under general anaesthesia. We conclude that I.V. Palonosetron and Dexamethasone are equally potent and superior antiemetics than Ondansetron in the prevention of PONV in patients undergoing elective laproscopic cholecystectomy under general anaesthesia.

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