

Comparison of Ondansetron And Metoclopramide on Reducing Nausea and Vomiting After Laparoscopic Cholecystectomy in Females

Muhammad Mohsin Riaz, Syed Qasim Ali Shah, Taimoor Azam Khan, Waqas Tariq, Fahad Husnain, Qaim Ali Bhatti

Department of Anesthesia, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To compare the antiemetic effects of Metoclopramide and Ondansetron in female patients undergoing laparoscopic cholecystectomy.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesia, Combined Military Hospital Rawalpindi, Pakistan, Feb to Jul 2022.

Methodology: Female patients aged between 15-80 years, American Society of Anesthesiologists Grade I or II planned for laparoscopic cholecystectomy were included in the study. Using non-probability consecutive sampling technique 66 patients were assigned to two Groups with 33 participants in each Group i.e., Group-A (Metoclopramide) and Group-B (Ondansetron) Group. Patients from Group-A received 10mg Metoclopramide while patients from Group-B received Ondansetron 4mg as a part of premedication. Recorded variables were nausea, vomiting and requirement of antiemetic medication at recovery, during the first 06 hours and during 06-24 hours post-operatively.

Results: Mean age of the patients was 44.61 ± 12.74 years. ASA distribution of the patients in our study revealed 28(84.8%) patients from Group-A and 26(78.8%) patients from Group-B belonged to ASA I while 05(15.2%) and 07(21.2%) were from ASA II in Group-A and Group-B respectively. Both Metoclopramide and Ondansetron were effective, however results were significant only for nausea and the requirement of antiemetic medication in post-anesthesia care unit.

Conclusion: Metoclopramide and Ondansetron both are effective in reducing nausea and vomiting after laparoscopic cholecystectomy in female patients. Ondansetron is superior to Metoclopramide in the reduction of nausea postoperatively however in case of vomiting there is no significant relationship between the two drugs.

Keywords: Anesthesia, Metoclopramide, Nausea, Ondansetron

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INTRODUCTION

Female gender and laparoscopic procedures are common factors predisposing the patients to Post Operative Nausea and Vomiting (PONV).¹ General anesthesia and the administration of opioids in addition to the pathological conditions like motion sickness, gastroesophageal reflux disease, neuromuscular disorders etc. can make the patients vulnerable to nausea and vomiting after surgical procedures.² Nausea and vomiting can delay the discharge of patients from the hospital in addition the patients are prone to complications like wound dehiscence, infections, aspiration and a number of complications which can increase morbidity and mortality.^{3,4} Several anesthesia techniques and pharmacological agents have been used to decrease the incidence of such adverse outcomes but none to date are considered gold standard.⁵

Identification of the patients and prompt

treatment both with an optimized anesthesia technique and administration of a suitable pharmacological agent are the mainstay to decrease the episodes of nausea and vomiting in such patients.⁶

Techniques with minimal use of opioid such as combination of epidural and general anesthesia have been used previously to reduce the incidence of post operative nausea and vomiting in patients undergoing laparoscopic procedures.⁷ An ideal antiemetic drug will have the least side effects. Several Groups of drugs have been used to minimize Post Operative Nausea and Vomiting including Dopamine receptor antagonist, alpha 2 receptor agonists, antimuscarinic, neurokinin, histamine antagonists, cannabinoid agonist and herbal medications.⁸ Dextrose containing intravenous fluids and application of acupressure have also been advocated to reduce the incidence of PONV.

Laparoscopic procedures are minimally invasive with early recovery and discharge of the patient, but can result in adverse cardiorespiratory and gastrointestinal complications with a high incidence of

Correspondence: Dr Muhammad Mohsin Riaz, Department of Anesthesia, Combined Military Hospital Rawalpindi Pakistan.

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PONV. Delayed recovery and increasing the hospital stay of the patients can lead to increase susceptibility to hospital acquired infections and increasing the burden on the hospital.⁹

The rationale of the study is to compare the effects of Metoclopramide and Ondansetron to reduce the incidence of nausea and vomiting after laparoscopic surgeries in female patients.

METHODOLOGY

The Quasi-experimental study was carried out at Department of Anesthesia, Combined Military Hospital Rawalpindi, Pakistan, from February to July 2022 after obtaining approval from the Institutional Ethical Review Board (ERB no. 250-B). By using WHO sample size calculator using statistics by Isazadehfar *et al.* revealed that Metoclopramide was effective antiemetic in 3% as compared to 30% in patients when Ondansetron was used as antiemetic.¹

Inclusion Criteria: Female patients with age ranging from 15-80 years, American society of anesthesiologist Grade (ASA) I or II planned for laparoscopic cholecystectomy were included.

Exclusion Criteria: Patients were excluded if they had obesity, gastroesophageal reflux disease, difficult airway, pregnancy, hepatic or renal disorder, drug addiction, mental illness, or were breast-feeding.

Sixty-six patients were assigned to two Groups with 33 participants in each Group i.e., Group-A (Metoclopramide) and Group-B (Ondansetron) (Figure). Before surgical procedures, informed consent was sought, and the participants were evaluated in the pre-anesthesia clinic. Detailed history, physical examination, laboratory investigations were evaluated, and optimization was done before surgery as per the requirement of each patient. Patients were kept nil per oral 08 hours before surgery as per the standard protocol followed at our hospital a day before surgery. On the day of surgery, inside the operation theatre noninvasive monitoring was attached to these patients using a pulse oximetry probe, non-invasive blood pressure cuff, electrocardiography electrodes and a temperature probe. Baseline hemodynamic parameters were noted, and premedication was done by using injection Nalbuphine 0.1mg/kg, Inj. Dexamethasone 0.08mg/kg intravenously. Patients from Group-A received 10mg Metoclopramide while patients from Group-B received Ondansetron 4mg as a part of premedication. Preoxygenation was done for

03minutes followed by induction of general anesthesia using Inj. Propofol 2 mg/kg and Inj. Atracurium 0.5 mg/kg. Bag mask ventilation was continued for 3 to 4 mins till complete muscle relaxation was ensued and airway was intubated with an endotracheal tube of 7 or 7.55mm internal diameter. Maintenance of anesthesia was done using Atracurium 0.1 mg/kg and Isoflurane at 1-2 minimum alveolar concentration. At completion of the surgical procedure patients were given inj. Neostigmine and inj. Glycopyrrolate intravenously in the dose of 0.05 and 0.01 mg/kg respectively. At the return of muscle power when spontaneous breathing efforts returned, and the patient obeyed verbal commands patients were extubated and shifted to the recovery for monitoring. All the patients were assessed at recovery, during 06 hours after recovery and 06-24 hours for nausea, vomiting and requirement of antiemetic medications respectively. The presence of nausea or vomiting for 05 mins or more was treated by rescue drug of Metoclopramide in the dose of 10mg/kg.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23. Chi-square test was used for comparison of qualitative variables. The *p* value of ≤0.05 was considered significant.

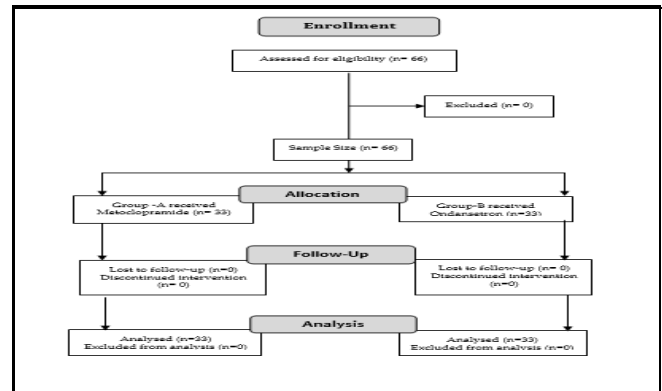


Figure: Patient Flow Diagram (n= 66)

RESULTS

Sixty-six patients studied which were divided into two Groups i.e., Group-A (n=33) and Group-B (n=33). ASA distribution of the patients in our study revealed 28(84.8%) patients from Group-A and 26(78.8%) patients from Group-B belonged to ASA I while 05(15.2%) and 07(21.2%) were from ASA II in Group-A and Group-B respectively. Mean age of the patients was 44.61±12.74 years. Distribution of the patients based on ASA Grade and Age are given in Table-I. Both Metoclopramide and Ondansetron were

effective in reducing the episodes of nausea with a superior role of Ondansetron as compared to Metoclopramide as given in Table-II. Vomiting was reduced in both the Groups, but the results were not significant as presented in Table-III. Requirement of antiemetic medication at the time of recovery was significantly lower in Group-B as compared to Group-A with a p-value of 0.005 as shown in Table-IV.

Table-I: American Society Of Anesthesiologists (Asa) Grade Distribution Between Groups (n=66)

American Society of Anesthesiologists (ASA) Grades	Group 'M' n (%)	Group 'O' N (%)
ASA I	28(84.8%)	26(78.8%)
ASA II	05(15.2%)	07 (21.2%)

Table-II: Frequency Of Nausea Between Groups (n=66)

Nausea	Group 'M' n (%)	Group 'O' n (%)	p- value
At Recovery	11(33.3%)	2(6.1%)	0.005
During 06 hours	16(48.5%)	09(27.3%)	0.076
During 06-24 hours	0	02(6.1%)	0.151

Table-III: Frequency Of Vomiting Between Groups (n=66)

Vomiting	Group 'M' (n = 33)	Group 'O' (n = 33)	p- value
At Recovery	0	0	-
During 06 hours	06 (18.2%)	04 (12.1%)	0.49
During 06-24 hours	0	01 (3%)	0.31

Table-ss: Requirement Of Antiemetic Medication At Different Intervals (n=66)

Antiemetic Medication	Group 'M' n (%)	Group 'O' n (%)	p- value
At Recovery	07(21.2%)	0(0.0%)	0.005
During 06 hours	06(18.2%)	08(24.2%)	0.547
During 06-24 hours	01(3%)	03(6.1%)	0.555

DISCUSSION

The Quasi-experimental study was performed to compare the effectivity of Metoclopramide and Ondansetron in attenuating nausea and vomiting after laparoscopic procedures in female patients. Both the drugs were effective in reducing the overall incidence of nausea, vomiting and requirement of antiemetic medication after laparoscopic cholecystectomy. Like our study the results of another study revealed that both the drugs are effective in prevention of nausea and vomiting with a superior role of Ondansetron as compared to Metoclopramide.¹⁰

Nausea and vomiting are unpleasant situations which may present due to administration of a pharmacological agent, anesthesia technique or already present comorbid of the patient. In the post

operative period early recovery and discharge from the hospital reduces the rate of complications and burden on the hospital. Several pharmacological agents, anesthesia techniques and minimizing emetic drugs during surgical procedures have been advocated to reduce the incidence of PONV.^{11,12}

Hydroxy-tryptamine receptors play a vital role in the nausea vomiting cascade and studies have shown effective role of drugs acting on these receptors for the reduction of PONV. Fonseca *et al* found in his study that palonosetron which is a new 5HT3 antagonist has a superior role with prolonged antiemetic effect and reduced requirement of rescue medication when administered to patients undergoing laparoscopic cholecystectomy.¹³

A Quasi-experimental study revealed that the best drugs for patients with mild to moderate risk were Metoclopramide and Ondansetron but patients who were at high risk of PONV undergoing laparoscopic cholecystectomy a combination of steroids and serotonin receptor antagonists were more effective.¹⁴

Patients undergoing laparoscopic cholecystectomy are at risk of PONV and a combination of acupuncture with antiemetics were found effective in decreasing the incidence of nausea and requirement of antiemetic drugs in the post operative period as compared to patients where only antiemetics were used. This proves a positive and beneficial role of acupuncture in such patients.¹⁵

Comparative study of haloperidol, dexmedetomidine, Metoclopramide and herbal medicine ginger showed equally effective role of all the drugs with no superiority of one over the other. Therefore, any of the drug can be used as a single remedy or in combination to reduce the incidence of PONV.¹⁶ Studies have found that dextrose solution if given to patients preemptively before surgical procedure can reduce the incidence of nausea and vomiting.^{17,18}

Different modalities are in practice or under research to reduce the incidence of PONV. Variable characteristics of patients require single or a combination of therapies, but none are gold standard yet. Our study proves a beneficial role of both the drugs in female patients undergoing laparoscopic procedure with a superior role of nausea prevention by Ondansetron as seen in previous research studies.

CONCLUSION

Metoclopramide and Ondansetron both are effective in reducing nausea and vomiting after laparoscopic

cholecystectomy in female patients. Ondansetron is superior to Metoclopramide in the reduction of nausea postoperatively however in case of vomiting there is no significant relationship between the two drugs.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MMR & SQAS: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

TAK & WT: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

FH & QAB: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Isazadehfard K, Entezariasl M, Shahbazzadegan B, Nourani Z, Shafae Y. The comparative study of Ondansetron and Metoclopramide effects in reducing nausea and vomiting after laparoscopic cholecystectomy. *Acta Med Iran* 2017; 254-258.
2. Dulay MS, Dulay JS. Antiemetics: types, actions and uses. *Br J Hosp Med* 2020; 81(5): 1-8. <https://doi.org/10.12968/hmed.2020.0050>
3. Fonseca NM, Pedrosa LR, Melo N, Oliveira RD. Efeito da palonosetrona, Ondansetrona e dexametasona na prevenção de náusea e vômito pós-operatório em videocolecistectomia com anestesia venosa total com propofol-remifentanil-ensaio clínico randomizado duplo cego. *Rev Bras Anesthesiol* 2020; 70: 464-470. <https://doi.org/10.1016/j.bjan.2020.08.001>
4. Sridharan K, Sivaramakrishnan G. Drugs for preventing postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy: network meta-analysis of randomized clinical trials and trial sequential analysis. *Int J Surg* 2019; 69: 1-2. <https://doi.org/10.1016/j.ijssu.2019.07.002>
5. Unsal N, Akcaboy ZN, Soyal OB, Akcaboy EY, Mutlu NM, Gogus N. Effectiveness of intraoperative laser acupuncture combined with antiemetic drugs for prevention of postoperative nausea and vomiting. *J Altern Complement Med* 2020; 26(1): 67-71. <https://doi.org/10.1089/acm.2019.0181>
6. Bansal T, Singhal S, Kundu K. Prospective randomized double-blind study to evaluate propofol and combination of propofol and sevoflurane as maintenance agents in reducing postoperative nausea and vomiting in female patients undergoing laparoscopic surgery. *Med Gas Res* 2022; 12(4): 137. <https://doi.org/10.4103/2045-9912.337994>
7. Seki H, Furumoto K, Sato M, Kagoya A, Hashimoto H, Sekiguchi Y, et al. Effects of epidural anesthesia on postoperative nausea and vomiting in laparoscopic

- gynecological surgery: A randomized controlled trial. *J Anesth* 2018; 32(4): 608-615. <https://doi.org/10.1007/s00540-018-2525-5>
8. Naemi AR, Kashanitabar V, Kamali A, Shiva A. Comparison of the effects of haloperidol, Metoclopramide, dexmedetomidine and ginger on postoperative nausea and vomiting after laparoscopic cholecystectomy. *J Med Life* 2020; 13(2): 206. <https://doi.org/10.7759/cureus.23615>
9. Balyan R, Kumar S, Lalitha K, Aneja S, George J. A Randomised Study to Compare Palonosetron With Ondansetron for Prophylaxis of Postoperative Nausea and Vomiting (PONV) Following Laparoscopic Gynecological Surgeries. *Cureus* 2022; 14(3): 23615. <https://doi.org/10.7759/cureus.23615>
10. Barney EZ, Fuller ME, Habib AS. Comparison of Metoclopramide and promethazine for the treatment of postoperative nausea and vomiting in the post-anesthesia care unit: A retrospective database analysis. *J Clin Anesth* 2019; 60: 47-48. <https://doi.org/10.1016/j.jclinane.2019.08.012>
11. Sahin SY, Iyigun E, Can MF. Effect of acupressure application to the P6 acupoint before laparoscopic cholecystectomy on postoperative nausea-vomiting: A randomized controlled clinical study. *Int J Nurs Stud* 2018; 87: 40-48. <https://doi.org/10.1016/j.ijnurstu.2018.07.011>
12. Niewiński PA, Wojciechowski R, Śliwiński M. CYP2D6 basic genotyping as a potential tool to improve the antiemetic efficacy of Ondansetron in prophylaxis of postoperative nausea and vomiting. *Adv Clin Exp Med* 2018; 27(11): 1499-1503. <https://doi.org/10.17219/acem/69451>
13. Albooghobeish M, Mohtadi A, Saidkhani V, Fallah H, Behaein K, Nesionpour S, et al. Comparison between effects of acupuncture and Metoclopramide on postoperative nausea and vomiting after gynaecological laparoscopy: A randomized controlled trial. *Anesth Pain Med* 2017;7(5). <https://doi.org/10.5812/aapm.12876>
14. Salman N, Aykut A, Sabuncu Ü, Şaylan A, Yağar S, Şekerci S. Dextrose administration may reduce the incidence of postoperative nausea and vomiting after laparoscopic cholecystectomy: a double blind randomized controlled trial. *Minerva Anesthesiol* 2020; 86(4): 379-386. <https://doi.org/10.23736/S0375-9393.20.13484-9>
15. Salazar-Parra M, Guzman-Ramirez BG, Pintor-Belmontes KJ. Gender differences in postoperative pain, nausea and vomiting after elective laparoscopic cholecystectomy. *World J Surg* 2020; 44(12): 4070-4076. <https://doi.org/10.1007/s00268-020-05744-3>
16. Guo W, Ding J, Jin X, Li G. Effect of cerebral oxygen saturation on postoperative nausea and vomiting in female laparoscopic surgery patients. *Medicine* 2017; 96(41) : e8275. <https://doi.org/10.1097/MD.00000000000008275>
17. Campos GO, Martins M, Jesus GN. Palonosetron versus Ondansetron for prevention of nausea and vomiting after total abdominal hysterectomy under spinal anesthesia with intrathecal morphine: a double-blind, randomized controlled trial. *BMC Anesthesiol* 2019; 19(1): 1-6. <https://doi.org/10.1186/s12871-019-0830-7>
18. Majedi MA, Sarlak S, Sadeghi Y, Ahsan B. Comparison of the Effects of Thoracic Epidural Anesthesia with General Anesthesia on Hemodynamic Changes and its Complications in Patients Undergoing Laparoscopic Cholecystectomy. *Adv Biomed Res* 2019 : 8: 7. https://doi.org/10.4103/abr.abr.193_18