Section: Anesthesiology

Original Research Article

A RANDOMIZED DOUBLE-BLIND COMPARATIVE STUDY OF ONDANSETRON, DEXAMETHASONE, AND THEIR COMBINATION FOR PREVENTING POST-OPERATIVE NAUSEA AND VOMITING IN OPEN CHOLECYSTECTOMY PATIENTS

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Abstract

Postoperative nausea and vomiting (PONV) remains a common complication following open cholecystectomy, with incidences ranging up to 70%. Despite available prophylactic options, optimal management remains elusive. This prospective randomized double-blind study aimed to compare the antiemetic efficacy of Ondansetron, Dexamethasone, and their combination in reducing PONV and assessing patient outcomes. A total of 270 ASA I and II patients were enrolled and randomized into three groups: Group O (Ondansetron), Group D (Dexamethasone), and Group O+D (Ondansetron + Dexamethasone). Incidences of nausea, vomiting, and patient satisfaction were recorded intraoperatively and postoperatively up to 24 hours. Statistical analysis demonstrated significantly lower incidences of PONV in the combination therapy group compared to Ondansetron alone across all observation periods ($p<0.005$). Our findings suggest that while Dexamethasone and Ondansetron as monotherapies show partial efficacy, their combination provides superior prophylaxis against PONV. Further studies with larger cohorts are necessary to validate these results and refine clinical practice.

INTRODUCTION

Postoperative nausea and vomiting (PONV) poses a notable challenge following open cholecystectomy, with reported incidence rates ranging from 20% to 30%, escalating up to 70% in gall bladder surgeries. Despite the availability of various pharmacological options for PONV prophylaxis, none have consistently demonstrated optimal efficacy. PONV can lead to significant complications including dehydration, electrolyte imbalances, wound dehiscence, aspiration risk, psychological distress, and delayed recovery from anesthesia, thereby prolonging hospital discharge. Our study aims to evaluate and compare the antiemetic efficacy of Ondansetron, Dexamethasone, and their combination in reducing PONV. Additionally, we seek to assess the relative advantages of each drug, evaluate the prophylactic antiemetic effects, consider safety implications, and measure patient satisfaction outcomes.

MATERIALS AND METHODS

This study was conducted at A.K Tibbiya College and Hospital, AMU, Aligarh, from June 2023 to May 2024. Informed consent was obtained from all participants. The research was designed as a prospective, randomized, double-blind study, using an envelope method for randomization.

Inclusion Criteria: A total of 270 patients, classified as ASA I and II, aged between 18 and 65 years and of both sexes, undergoing open cholecystectomy.

Intervention: The patients were randomly divided into three groups. Group O received 0.1 mg/kg of Ondansetron, Group D received 0.1 mg/kg of Dexamethasone, and Group O+D received both Ondansetron and Dexamethasone (each at 0.1 mg/kg) administered half an hour before surgery. Group O was designated as the control group.

Exclusion Criteria

The study excluded patients with ischemic heart disease, gastro-esophageal reflux disease, uncontrolled diabetes, uncontrolled hypertension, alcohol addiction, and smokers.

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Preoperative and Intraoperative Procedures

Preoperative assessment (PAC) was performed a day before surgery. All patients received 0.5 mg of Tablet Alprazolam the night before surgery. On the day of surgery, an intravenous line was established, and patients were preloaded with 500-1000 ml of Ringer lactate. Essential monitors, including SpO2, BP cuff, and ECG, were applied. Spinal anesthesia was administered in the sitting position at the L3-L4 level using a 25 G Quincke needle to inject 3.5 ml of heavy Bupivacaine, after which the patient was positioned supine.

Outcome Measures

An independent nurse, unaware of the patient's group assignment, recorded the incidence of nausea, vomiting, or retching intraoperatively and up to 24 hours postoperatively. The recording periods were categorized into three intervals: intraoperative (0-1 hours), early postoperative (1-6 hours), and late postoperative (6-24 hours). Patients were assessed for episodes of retching, nausea, vomiting, the need for additional antiemetics, and overall satisfaction. The use of rescue antiemetics was also evaluated, with Metoclopramide (0.1 mg/kg) administered if more than two episodes of vomiting occurred within the first 24 hours post-surgery.

Statistical Analysis

Demographic data were analyzed using the Student's t-test. Quantitative variables were presented as mean ± SD, while qualitative variables were expressed as frequency and percentage. The incidence of retching, postoperative nausea and vomiting (PONV), and the need for rescue medication were evaluated using the chi-square test. A p-value of ≤ 0.05 was considered statistically significant, and a p-value of ≤ 0.001 was considered highly significant.

RESULTS

The study was carried out in the Department of Jarahat (Surgery) at A.K. Tibbiya College and Hospital from June 2023 to May 2024, including 270 patients classified as ASA grade I and II. The three groups were comparable in terms of age, sex, weight, height, duration of surgery, and ASA status.

We separately analyzed incidence of retching, nausea and vomiting Intra-operatively and post operatively for 0-1 hours, 1-6 hours for up to 24 hours. [Table 1]

Group O was considered as control Group & found that there were no statistically significant difference in the incidence of retching, nausea & vomiting and need of rescue drug. [Table 2]

In 0-1 hr the incidence of nausea and vomiting was significantly lower ($p<0.005$) in Group O+D (10%) as compare to Group O (63%). After 1-6 hrs the incidence was 36% in Group O & 5.5% in Group O+D ($p<0.005$). During 6-24 hrs, 13% patients in Group O had PONV & none of the patient had PONV in Group O+D ($p<0.05$). [Table 3]

Table 1: Demographic data of patients

Particulars	Group D	Group O	Group O+D
Age (years) (Mean±SD)	48.67±10.57	47.55±12.78	46.34±15.89
Weight (Kgs) (Mean±SD)	65.30±14.6	64.40±16.91	63.14±18.60
Sex (M/F)	21/69	19/71	9/81
Height (cms)	153±2.3	156±3.8	152±1.6
Physical status			
ASA I	65	61	67
ASA II	35	39	33
Duration of surgery (min)	37.5 ± 12.6	35.2 ± 9.5	36.5 ± 10.2

ASA I- Normal healthy patient.

ASA II- A patient with mild systemic disease with no functional limitations

Table 2: Comparison of nausea & vomiting in Groups

Number of patients	Retching	Nausea & vomiting 0-1 hours	Nausea & vomiting 1 - 6 hours	Nausea & vomiting 6 - 24hours	Need of supplement
Group O (n =90)	81(90%)	63(70%)	33 (36%)	12(13%)	6 (6.6%)
Group D (n =90)	83(92%)	79(87%)	27(30%)	8(8.8%)	4(4.4%)
p-value	>0.10	>0.01	>0.01	>0.01	

Table 3: Comparison of nausea & vomiting in Groups

Number of patients	Retching	Nausea & vomiting 0-1 hours	Nausea & vomiting 1 - 6 hours	Nausea & vomiting 6 - 24hours	Need of supplement
Group O (n =90)	81(90%)	63(70%)	33 (36%)	12(13%)	6 (6.6%)
Group O+D (n =90)	21(23%)	9(10%)	5(5.5%)	0	0
p value	0.05	<0.005	<0.005	<0.025	

p-value <0.05 is considered as statistically significant

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DISCUSSION

Postoperative nausea and vomiting (PONV) are among the most distressing and unpleasant experiences for patients. Severe postoperative emesis can result in dehydration, electrolyte imbalance, increased pain, wound dehiscence, and potentially life-threatening complications such as aspiration pneumonitis, thereby affecting the overall outcome of surgery.

Ondansetron, a 5HT3 receptor antagonist, is highly specific and selective for nausea and vomiting. It works by binding to serotonin receptors in the chemoreceptor trigger zone (CTZ) of the area postrema. The antiemetic mechanism of corticosteroids, such as dexamethasone, is not fully understood but may involve the inhibition of prostaglandin synthesis and a decrease in 5HT3 levels in the central nervous system. Dexamethasone is most effective when administered at the time of induction and is particularly useful for preventing late-onset nausea and vomiting due to its long half-life of 36 to 72 hours. In our study, both drugs were administered 30 minutes before surgery. While the recommended dose for PONV is 4 mg, our study found maximum efficacy with 8 mg of ondansetron. We observed no significant differences in efficacy between male and female patients or among patients with a history of motion sickness.

Comparative Studies

Several studies have compared the efficacy of dexamethasone and ondansetron

- Michael et al. used various doses of dexamethasone and ondansetron and found no significant differences among the groups except for the group receiving 2 mg of dexamethasone.
- Souvik Maitra et al. concluded that dexamethasone is superior to ondansetron in preventing PONV 4-6 hours after surgery, though both drugs are equally effective within the first 24 hours postoperatively.
- L. Lopez et al. reported that 52% of patients in the ondansetron group and 60% in the dexamethasone group experienced PONV, but the incidence was significantly lower when the drugs were used in combination.
- Xian-Xue-Wang et al. found that dexamethasone was less effective for early PONV compared to ondansetron but highly effective for late PONV, suggesting it as a viable alternative to ondansetron.
- Sandhya et al. noted that 83.3% of patients in the dexamethasone group and 93.3% in the ondansetron group had no nausea or vomiting in ENT surgeries, with equal patient satisfaction scores in both groups.
- K. Ahsan et al. found that combining ondansetron and dexamethasone significantly reduced the incidence of nausea or vomiting compared to ondansetron alone (28% vs. 12%, $p<0.046$).
- F. Bano et al. observed a statistically significant lower frequency of nausea and vomiting in the combination group compared to the dexamethasone alone group ($p=0.035$), with higher use of rescue antiemetics in the latter ($p=0.022$).
- M. Elhakim et al. determined that a minimum dose of 8 mg of dexamethasone and 4 mg of ondansetron was required for effective PONV prevention.
- Gildasio S. de Oliveira et al. found that 4-5 mg and 8-10 mg doses of dexamethasone were equally effective, supporting the current SAMBA guidelines.
- Nita D'Souza et al. concluded that the overall incidence of PONV was highest within the first 3 hours in all groups, with the lowest request for rescue antiemetics in the group receiving 4 mg of dexamethasone.
- Jash D et al. reported that 86% of patients in both the ondansetron and dexamethasone groups experienced no emesis, with a higher incidence of retching in the first hour and less PONV after 6-12 hours.

CONCLUSION

Our study did not observe any significant adverse events or differences in discharge times and patient satisfaction across the groups. Single-dose dexamethasone was free from significant side effects, including delayed wound healing, and was cost-effective. Minor complications, such as headache, dizziness, and constipation, were reported by a few patients within 24 hours.

In summary, while dexamethasone and ondansetron alone are not fully effective in preventing PONV, their combination is highly effective. Further studies on larger patient groups are needed to confirm these findings.

REFERENCES

1. Macario, M. Weinger, S. Carney, and A. Kim, "Which clinical anesthesia outcomes are important to avoid? The perspective of patients," Anesthesia and Analgesia, vol. 89, no. 3, pp. 652–658, 1999.View at: Publisher Site | Google Scholar
2. M. F. Watcha and P. F. White, "Postoperative nausea and vomiting: its etiology, treatment, and prevention," Anesthesiology, vol. 77, no. 1, pp. 162–184, 1992.View at: Publisher Site | Google Scholar
3. N. D'souza, M. Swami, and S. Bhagwat, "Comparative study of dexamethasone and ondansetron for prophylaxis of postoperative nausea and vomiting in laparoscopic gynecologic surgery," International Journal of Gynecology and Obstetrics, vol. 113, no. 2, pp. 124–127, 2011.View at: Publisher Site | Google Scholar
4. Fujii Y, Tanaka H, Toyooka H. Granisetron and dexamethasone provide more improved prevention of postoperative emesis than granisetron alone in children. Can J Anaesth 1996; 43 1229-32.
5. Henzi I, Walder B, Tramèr MR. Dexamethasone for the prevention of postoperative nausea and vomiting: A

ISSN (O): 2687-5365; ISSN (P): 2753-6556

quantitative systematic review. Anesth Analg. 2000; 90:186–194.
6. J.-J. Wang, S.-T. Ho, Y.-H. Uen et al., "Small-dose dexamethasone reduces nausea and vomiting after laparoscopic cholecystectomy: a comparison of tropisetron with saline," Anesthesia and Analgesia, vol. 95, no. 1, pp. 229–232, 2002.View at: Publisher Site | Google Scholar
7. Biswas BN, Rudra A. Comparison of granisetron and granisetron plus dexamethasone for the prevention of postoperative nausea and vomiting after laparoscopic cholecystectomy. Acta Anaesthesiol Scand. 2003; 47:79–83.
8. Michael J, Mathew W. M. ondensetron and Dexamethasone dose combination for prophylaxis against post-operative nausea and vomiting. International Anesth seserch sosity. 2006 Dec ;108
9. Souvik Maitra,1 Anirban Som,1 Dalim K. Baidya,1 and Sulagna Bhattacharjee. Comparison of Ondansetron and Dexamethasone for Prophylaxis of Postoperative Nausea and Vomiting in Patients Undergoing Laparoscopic Surgeries: A Meta-Analysis of Randomized Controlled Trials. Anesthesiology Research and Practice, Volume 2016 |Article ID 7089454
10. Lopez-Olaondo L, Carrascosa F, Pueyo FJ, Mondero P, Busto M, Suez A. Combination of ondansetron and dexamethasone in the prophylaxis of postoperative nausea and vomiting. Br J Anaesth 1996; 76: 835-840.
11. Sandhya MS, Sugandha KR. Comparison ondansetron with Dexamethsone in the ptrevention of post-operative Nausea and vomiting in ENT Surgeries. J Medical Science and Clinical Research. July 2018 vol 6 (7)
12. Ahsan K, Abbas N. comparision of efficacy of ondensetron and dexamethasone combination and ondensetron alone in preventing postoperative nausea and vomiting after laproscopic cholecystectomy. J Pak Assoc 2014 March.
13. Fauzia bano, Safia Zafar, Sadqa Aftab. Dexamethasone plus ondansetron for prevention of poatoperative nausea and vomiting in patients undergoing Laproscopic cholecysyectomy: a comparison with dexamethsone alone. J Coll physician Surg pak 2008May ;18(5);265-9
14. Elhakim M, Nafie M, Mahmoud K, Atef A: Dexamethasone 8mg in combination with ondansetron 4mg appears to be the optimal dose for the prevention of nausea and vomiting after laparoscopic cholecystectomy. Can J Anaesth 2002, 49:922-6. Vol 4, Issue 03, 2015.
15. De Oliveria GS, Castro-Alves LJS, Ahmad S et al. Dexamethasone to prevent postoperative nausea and vomiting; an updated meta-analysis of randomized controlled trails. Center of Reviews and Dissemination. York (UK) 2014.
16. Tong J Gan, Tricia A Meyer, Society for Ambulatory Anesthesia guidelines for the manegment of postoperative nausea and vomiting. Anesth Anelgesia. 2007 Dec;105 (6).
17. Nita D'Souza, Mohan Swami, Shama Bhagwat. Comparative study of dexamethsone and ondansetron for prophylaxis of post-operative nausea and vomiting in laprascopic gynecological sugaery. Int J Gynecol Obstet.2011 May ;13(2).
18. Jash D, Haldar P et al. Comparative study between ondansetron and Dexamethasone for preventing post-operative nausea & vomiting after laparoscopic cholecystectomy. JEMDS, 2019, 8(36).

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