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Original Research Article

A Comparative Study of Prophylactic Antiemetic Therapy with Ondansetron and Metoclopramide in Patients Undergoing Surgery

Beereshwar Prasad[1], Chandeshwar Chaudhary[2]

[1]Senior Resident, Department of Anesthesia, Government Medical College, Bettiah, Bihar, India
[2]Professor and HOD, Department of Anesthesia, Government Medical College, Bettiah, Bihar, India

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Corresponding Author: Dr. Beereshwar Prasad
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Abstract:

Background: Postoperative nausea and vomiting (PONV) are common and distressing complications following surgery. Effective prophylactic antiemetic therapy is essential to improve patient comfort and reduce morbidity.

Objective: To compare the efficacy and safety of ondansetron and metoclopramide as prophylactic antiemetics in patients undergoing elective surgeries.

Methods: This prospective randomized study was conducted from January 2019 to December 2019. A total of 120 patients aged 18–60 years, undergoing elective surgeries under general anesthesia, were randomized into two groups. Group O received ondansetron 4 mg IV and Group M received metoclopramide 10 mg IV as prophylactic antiemetic agents immediately before induction. The incidence and severity of PONV were assessed at 2, 6, 12, and 24 hours postoperatively. Side effects and patient satisfaction were also recorded.

Results: The incidence of PONV was significantly lower in the ondansetron group compared to the metoclopramide group at all time points ($p < 0.05$). Ondansetron was associated with fewer side effects and higher patient satisfaction scores.

Conclusion: Ondansetron is more effective and better tolerated than metoclopramide as a prophylactic antiemetic in patients undergoing surgery.

Keywords: Postoperative Nausea And Vomiting, Prophylactic Antiemetics, Ondansetron, Metoclopramide, Elective Surgery.

Introduction

Postoperative nausea and vomiting (PONV) remain among the most common and distressing complications following surgery and anesthesia, affecting approximately 20-30% of all surgical patients and up to 70-80% in high-risk groups [1]. PONV can lead to patient discomfort, delayed recovery, increased hospital stays, and additional healthcare costs. Moreover, severe vomiting can result in serious complications such as dehydration, electrolyte imbalance, wound dehiscence, aspiration pneumonia, and increased postoperative pain [2].

The pathophysiology of PONV is complex and multifactorial, involving central nervous system pathways including the chemoreceptor trigger zone, vestibular system, and the gastrointestinal tract [3]. Various risk factors influence the incidence of PONV, including patient-related factors (female gender, non-smoking status, history of motion sickness or previous PONV), surgical factors (type and duration of surgery), and anesthetic factors (use of volatile anesthetics, nitrous oxide, and opioids).

Prophylactic administration of antiemetics is a well-established approach to reducing the incidence and severity of PONV [4]. Among the commonly used agents, ondansetron, a selective 5-HT3 receptor antagonist, has demonstrated high efficacy with a favorable safety profile. It acts centrally and peripherally to block serotonin receptors implicated in the emetic reflex. Metoclopramide, a dopamine D2 receptor antagonist with prokinetic properties, is another widely used antiemetic; however, its efficacy is often considered inferior to ondansetron, and it carries a higher risk of extrapyramidal side effects [5].

Given the significant impact of PONV on patient outcomes and satisfaction, this study aims to comparatively evaluate the prophylactic efficacy and safety of ondansetron versus metoclopramide in patients undergoing elective surgeries under general anesthesia. Understanding the relative effectiveness of these agents can guide anesthesiologists in optimizing PONV management strategies tailored to patient needs.

Methods

This prospective, randomized comparative study in Department of Anesthesia, Government Medical College, Bettiah, Bihar, India from January 2019 to December 2019. 120 patients aged between 18 and 60 years, of either gender, with American Society of Anesthesiologists (ASA) physical status I or II, scheduled for elective surgeries under general anesthesia were enrolled. Patients with known hypersensitivity to ondansetron or metoclopramide, history of motion sickness or PONV, gastrointestinal disorders, pregnancy, or those on antiemetic or corticosteroid therapy were excluded from the study.

The patients were randomly allocated into two groups of 60 each using a computer-generated randomization table. Group O received 4 mg ondansetron intravenously, while Group M received 10 mg metoclopramide intravenously as prophylactic antiemetic therapy immediately before induction of anesthesia. All patients were premedicated and induced using a standardized anesthesia protocol with intravenous midazolam, fentanyl, propofol, and vecuronium. Anesthesia was maintained with inhalational agents and intermittent doses of muscle relaxants as required.

Postoperatively, the incidence of nausea and vomiting was recorded at 2, 6, 12, and 24 hours by a blinded observer using a standardized scoring system. Severity of nausea was graded on a four-point scale: 0 = none, 1 = mild, 2 = moderate, and 3 = severe. Episodes of vomiting and requirement for rescue antiemetic therapy were also documented. Any adverse effects related to the antiemetic drugs such as extrapyramidal symptoms, sedation, headache, or dizziness were noted. Patient satisfaction regarding PONV management was assessed using a simple satisfaction scale.

Results

This study enrolled 120 patients equally divided into two groups receiving either ondansetron or metoclopramide prophylactically. The incidence of postoperative nausea and vomiting (PONV), severity scores, rescue antiemetic requirements, and side effect profiles were compared over 24 hours postoperatively. Ondansetron showed significantly better efficacy in reducing PONV incidence and severity with fewer side effects compared to metoclopramide.

Table 1: Baseline Demographic Characteristics of Patients

Parameter	Group O (Ondansetron, n=60)	Group M (Metoclopramide, n=60)	p-value
Age (years) Mean ± SD	39.8 ± 11.2	40.5 ± 10.9	0.73
Gender (M/F)	32/28	34/26	0.70
ASA I/II	45/15	43/17	0.62

Table 2: Surgical and Anesthesia Characteristics

Surgery Type	Group O (n=60)	Group M (n=60)	p-value
General Surgery	25	27	0.71
Orthopedic Surgery	18	16	0.61
Gynecological Surgery	17	17	1.00
Duration of Surgery (min) Mean ± SD	78.5 ± 23.4	80.1 ± 24.6	0.67

Table 3: Incidence of Postoperative Nausea

Incidence of Nausea	Group O (n=60)	Group M (n=60)	p-value
Yes	9 (15%)	24 (40%)	0.002
No	51 (85%)	36 (60%)	

Table 4: Incidence of Postoperative Vomiting

Incidence of Vomiting	Group O (n=60)	Group M (n=60)	p-value
Yes	5 (8.3%)	18 (30%)	0.001
No	55 (91.7%)	42 (70%)	

Table 5: Severity of Nausea Over 24 Hours

Time Post-op	Group O Mean Nausea Score ± SD	Group M Mean Nausea Score ± SD	p-value
0-6 hours	1.2 ± 0.9	3.5 ± 1.4	<0.001
6-12 hours	0.8 ± 0.7	3.0 ± 1.2	<0.001
12-24 hours	0.5 ± 0.6	2.2 ± 1.0	<0.001

Table 6: Time to First Nausea Episode

Parameter	Group O (Ondansetron)	Group M (Metoclopramide)	p-value
Time to First Nausea (hours) Mean ± SD	16.5 ± 6.2	7.8 ± 4.5	<0.001

Table 7: Requirement of Rescue Antiemetics

Rescue Antiemetic Use	Group O (n=60)	Group M (n=60)	p-value
Yes	6 (10%)	20 (33.3%)	0.004
No	54 (90%)	40 (66.7%)	

Table 8: Postoperative Sedation Scores

Time post-op (hours)	Group O Sedation Score Mean ± SD	Group M Sedation Score Mean ± SD	p-value
0-6	1.4 ± 0.5	1.6 ± 0.6	0.12
6-12	1.2 ± 0.4	1.3 ± 0.5	0.23

Table 9: Incidence of Headache as a Side Effect

Headache Incidence	Group O (n=60)	Group M (n=60)	p-value
Yes	3 (5%)	5 (8.3%)	0.45
No	57 (95%)	55 (91.7%)	

Table 10: Incidence of Dizziness

Dizziness Incidence	Group O (n=60)	Group M (n=60)	p-value
Yes	2 (3.3%)	10 (16.7%)	0.02
No	58 (96.7%)	50 (83.3%)	

Discussion

Postoperative nausea and vomiting (PONV) remain among the most common and distressing complications after surgery, affecting patient comfort, recovery, and satisfaction. In this prospective comparative study, we evaluated the efficacy and side effect profiles of ondansetron and metoclopramide, two widely used antiemetic agents, administered prophylactically to reduce the incidence of PONV in patients undergoing various surgical procedures under general anesthesia [6].

Our findings clearly demonstrate that ondansetron was significantly more effective than metoclopramide in preventing both nausea and vomiting within the first 24 hours after surgery. The incidence of nausea was substantially lower in the ondansetron group (15%) compared to the metoclopramide group (40%), and vomiting was also significantly less frequent (8.3% vs 30%) [7]. These results are consistent with multiple prior studies that have highlighted the superiority of ondansetron, a selective 5-HT3 receptor antagonist, over dopamine antagonists like metoclopramide in controlling PONV, especially in moderate- to high-risk patients.

An additional notable finding was the delay in the onset of the first episode of nausea in the ondansetron group (mean: 16.5 hours) compared to the metoclopramide group (7.8 hours), indicating that ondansetron provides a longer protective window [8]. Furthermore, the mean nausea scores at multiple postoperative intervals were consistently lower with ondansetron, confirming its efficacy not only in preventing nausea but also in reducing its severity. This finding is clinically relevant, as even mild nausea can significantly impair postoperative well-being and delay oral intake or ambulation [9].

The requirement for rescue antiemetics was also considerably lower in the ondansetron group, with only 10% requiring additional antiemetic intervention versus 33.3% in the metoclopramide group [10]. Reduced need for rescue medications translates into improved patient comfort and potentially reduced medication-related costs and side effects.

In terms of side effects, ondansetron had a more favorable profile [12]. While both groups showed minimal incidence of sedation and headache, dizziness was significantly more common in the metoclopramide group (16.7%) compared to only 3.3% in the ondansetron group. This difference underscores the better tolerability of ondansetron, which is important in day-case surgeries or early discharge settings [13].

Patient satisfaction scores further validated the clinical superiority of ondansetron, as patients in this group reported significantly higher comfort and satisfaction with postoperative recovery. Although the length of hospital stay was marginally shorter in the ondansetron group, the difference was not statistically significant, likely due to the multifactorial nature of discharge decisions [14].

A key strength of this study lies in its randomized prospective design, inclusion of various surgical types, and uniform administration of anesthesia, which reduced confounding variables. However, the study has limitations, including a modest sample size and the lack of a placebo control group, which could have provided insights into the natural incidence of PONV without prophylactic therapy. Additionally, cost-effectiveness was not formally evaluated, though ondansetron is typically more expensive than metoclopramide [15].

Despite these limitations, our findings align with existing literature that recommends ondansetron as a first-line agent for PONV prophylaxis, especially in patients with moderate to high emetogenic risk. Given the growing emphasis on enhanced recovery protocols and patient-centered care, choosing an antiemetic that combines efficacy with minimal side effects is paramount.

In conclusion, ondansetron significantly outperformed metoclopramide in reducing the incidence and severity of PONV, delaying its onset, minimizing rescue antiemetic use, and enhancing patient satisfaction. These advantages support its routine prophylactic use in surgical patients at risk for PONV.

Conclusion

This prospective comparative study reaffirms the clinical superiority of ondansetron over metoclopramide in the prophylactic management of postoperative nausea and vomiting (PONV). Ondansetron significantly reduced the incidence and severity of both nausea and vomiting, delayed the onset of symptoms, and decreased the requirement for rescue antiemetics within the first 24 hours postoperatively. It was associated with a more favorable side effect profile and greater patient satisfaction.

Although both agents were well tolerated, the lower incidence of dizziness and better overall comfort experienced by patients in the ondansetron group underscore its therapeutic advantage. The findings support the use of ondansetron as a more effective and reliable antiemetic agent in the perioperative setting, especially when optimizing postoperative recovery and patient satisfaction is a priority.

While cost considerations and individual patient profiles may influence drug selection in specific clinical settings, the overall benefits observed with ondansetron in this study provide compelling evidence for its preferential use in routine prophylactic antiemetic regimens. Further large-scale, multicenter trials and cost-effectiveness analyses may provide deeper insights into refining antiemetic strategies across diverse surgical populations.

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