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Early Postoperative Nausea and Vomiting following General Anaesthesia in Patients Receiving Prophylactic Intravenous Ondansetron: A Retrospective Observational Study.

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) is a common complication following general anaesthesia. It causes patient discomfort, delays recovery and can prolong discharge from the post-anaesthesia care unit. Ondansetron, a 5-hydroxytryptamine-3 (5-HT₃) receptor antagonist, is widely used for PONV prophylaxis. This study examined the occurrence of early postoperative nausea and vomiting in patients who underwent surgery under general anaesthesia and received intravenous ondansetron before extubation.

Methods: This was a retrospective observational study based on review of the perioperative records of 50 patients who underwent surgery under general anaesthesia at the postoperative anaesthesia care unit of Mahatma Gandhi Medical College and Research Institute, Puducherry. Patient characteristics, documented PONV risk factors, timing of ondansetron administration and postoperative vomiting were extracted from the records. Patients were categorised into low-, moderate- and high-risk groups for PONV based on the number of established risk factors documented (0–1 factors: low risk; 2 factors: moderate risk; ≥3 factors: high risk).

Results: Of the 50 patient records reviewed, 15 patients (30%) experienced postoperative nausea and/or vomiting, while 35 patients (70%) did not. The study population comprised 33 male and 17 female patients. PONV occurred in 8 of 33 male patients (24.2%) and 7 of 17 female patients (41.2%). Risk stratification classified 35 patients (70%) as low risk, 12 (24%) as moderate risk, and 3 (6%) as high risk. All patients had received intravenous ondansetron before extubation; no untreated comparison group was available in the dataset.

Conclusions: Early PONV was documented in 30% of patients despite prophylactic intravenous ondansetron. These findings highlight the importance of systematic risk assessment and documentation of PONV before, during and after surgery. Because this study lacked a control group, the results cannot be used to draw conclusions about the comparative efficacy of ondansetron. Prospective studies using a standardised risk-assessment tool and a clearly defined antiemetic protocol are needed.

Keywords: Postoperative Nausea and Vomiting; General Anaesthesia, Ondansetron; Postoperative Anaesthesia Care Unit; Antiemetic; Risk Assessment.

INTRODUCTION

Postoperative nausea and vomiting is one of the most common and distressing complications following surgery and anaesthesia. Although it is usually self-limiting, PONV can cause significant discomfort and interfere with oral intake, mobilisation and wound healing. When vomiting is persistent, it may also lead to dehydration, electrolyte disturbance, risk of aspiration and delayed discharge from the post-anaesthesia care unit. Early identification and prevention of PONV are therefore important components of perioperative care.

PONV results from the interaction of several factors. Patient-related factors include female sex, younger age, a prior history of PONV or motion sickness, and non-smoking status. Anaesthesia-related factors include the choice of volatile anaesthetic agent, use of nitrous oxide and administration of postoperative opioids. Surgical factors, including the type and duration of surgery, also influence risk.

Current consensus guidelines emphasise identifying patients at increased risk and reducing modifiable baseline risk factors before selecting an appropriate pharmacological prophylaxis strategy.^[1,2]

The simplified Apfel score remains one of the most widely used tools for estimating PONV risk in adults. Its four predictors are female sex, a prior history of PONV or motion sickness, non-smoking status and anticipated postoperative opioid use; predicted PONV risk increases approximately in proportion to the number of factors present.^[3]

Ondansetron is a 5-HT₃ receptor antagonist commonly used in perioperative practice. It acts at both central and peripheral sites within the vomiting pathway and is frequently administered towards the end of surgery to prevent PONV. The Fifth Consensus Guidelines recommend a risk-adapted approach to PONV prevention, in which ondansetron continues to serve as a standard prophylactic agent.^[4] PONV has been described as a deceptively simple but mechanistically complex clinical problem, arising from the interaction of patient, anaesthetic and surgical factors that often act together rather than in isolation.^[5] Pharmacological prevention has traditionally relied on antiemetic agents from several drug classes, of which 5-HT₃ receptor antagonists such as ondansetron remain among the most extensively evaluated.^[6] Despite the availability of effective antiemetics, PONV

continues to occur in routine clinical practice, and its control depends on the patient's baseline risk, the anaesthetic technique used, the type of surgery and whether additional preventive measures are employed. Local audits of this kind are useful because they describe the pattern of PONV within a particular institution and help identify opportunities to improve risk documentation and risk-based management.

The present study was undertaken in the postoperative anaesthesia care unit of Mahatma Gandhi Medical College and Research Institute, Puducherry, to examine the occurrence of early postoperative nausea and vomiting among patients undergoing general anaesthesia who received prophylactic intravenous ondansetron before extubation.

METHODS

Study design and setting: This was a retrospective observational study based on review of perioperative records in the postoperative anaesthesia care unit of Mahatma Gandhi Medical College and Research Institute, Puducherry. Data were drawn from an undergraduate dissertation that involved a retrospective review of records collected over a one-year period.

Study population: The study included patients who had undergone elective surgery under general anaesthesia and had documented administration of prophylactic intravenous ondansetron before extubation. The pre-, intra- and postoperative records of these patients were reviewed for the study period.

Sample size: A total of 50 patient records were available and included in this analysis.

Data collection: Data were obtained from patient records, anaesthesia documentation and postoperative recovery records. Variables recorded included demographic characteristics, relevant medical history, perioperative risk factors, anaesthetic technique, antiemetic administration and the postoperative occurrence of nausea or vomiting.

The original data-collection proforma recorded age, sex, operation performed, medical illness, smoking and alcohol history, prior history of nausea or vomiting, intraoperative opioid administration, ondansetron administration before extubation, perioperative vital signs, postoperative nausea and

vomiting, severity of nausea, time to first episode, rescue antiemetic use, and adverse events.

PONV risk assessment: Patients were stratified into low-, moderate- and high-risk groups using a simplified scoring approach based on four established risk factors: female sex, non-smoking status, a prior history of PONV or motion sickness, and anticipated postoperative opioid use.^[3] Patients with 0–1 risk factors were classified as low risk, those with 2 risk factors as moderate risk, and those with 3 or more risk factors as high risk, consistent with previously described risk categories.^[1,2] The number of risk factors present for each patient was determined from the perioperative documentation available in the original records. This simplified four-factor model was preferred over more elaborate predictive tools because of its ease of clinical application and comparable predictive performance reported in independent validation studies.^[7] Thirty-five patients were classified as low risk, 12 as moderate risk and 3 as high risk.

Outcome measure: Nausea was defined as an unpleasant sensation of the urge to vomit without expulsion of gastric contents. Vomiting was defined as the forceful expulsion of upper gastrointestinal contents through the mouth. The original data-collection proforma recorded nausea and vomiting as separate items; however, the dataset available for this analysis reported outcomes primarily as documented vomiting episodes. In this manuscript, the term PONV therefore refers to the composite outcome of any documented postoperative nausea and/or vomiting during the observation period, rather than to nausea and vomiting analysed as fully

independent endpoints. This is acknowledged as a limitation of the retrospective dataset.

Ondansetron administration: All patients received intravenous ondansetron before extubation, consistent with institutional practice. Patient-specific dose and exact timing of administration were not consistently recorded in the retrospective records; where documented, ondansetron was given near the end of surgery, before extubation, in keeping with the standard institutional dose of 4 mg intravenously. This information should be interpreted with caution given the incomplete documentation of dosing in the original records.

Statistical analysis: Results are presented as frequencies and percentages. Descriptive statistics were used throughout, consistent with the original dataset. No inferential statistical test was performed in the original dissertation, and none has been introduced in this manuscript.

Ethical considerations: Approval was obtained from the Institutional Human Ethics Committee prior to data collection in the original undergraduate dissertation.

RESULTS

Overall occurrence of PONV

Fifty patient records were reviewed. Among these, 15 patients (30%) developed postoperative nausea and/or vomiting, while 35 patients (70%) did not experience PONV during the documented postoperative observation period. (*Table 1*)

Table 1. Overall occurrence of PONV

PONV status	Number of patients	Percentage
PONV present	15	30%
PONV absent	35	70%
Total	50	100%

Frequency of vomiting episodes

No vomiting episodes were documented in 35 patients, one episode was documented in 12 patients,

and two episodes were documented in 3 patients. Most patients who experienced vomiting had a single documented episode. (*Table 2*)

Table 2. Number of postoperative vomiting episodes

Number of vomiting episodes	Patients	Percentage
0	35	70%
1	12	24%
2	3	6%
Total	50	100%

Distribution according to sex

The study population comprised 33 male and 17 female patients. PONV occurred in 8 male patients

and 7 female patients, corresponding to 24.2% of male patients and 41.2% of female patients. (Table 3)

Table 3. Distribution of PONV according to sex

Sex	Total patients	PONV	No PONV	PONV (%) within sex
Male	33	8	25	24.2%
Female	17	7	10	41.2%
Total	50	15	35	30.0%

The proportion of PONV was numerically higher among female patients than male patients. However, the available sample was small, and no statistical test was performed; this observation should therefore be regarded as descriptive rather than as evidence of a statistically significant association.

PONV risk groups

Thirty-five patients (70%) were classified as low risk, 12 (24%) as moderate risk and 3 (6%) as high risk. (Table 4)

Table 4. Distribution according to PONV risk category

Risk category	Number	Percentage
Low risk	35	70%
Moderate risk	12	24%
High risk	3	6%
Total	50	100%

The original records indicated that low-risk patients received no additional prophylactic intervention beyond ondansetron. Documentation of additional interventions in the moderate- and high-risk groups was incomplete in the retrospective dataset, and no reliable conclusion could be drawn regarding the relationship between risk category and the need for additional intervention; this is noted as a limitation of the available data.

Ondansetron administration and outcome

All patients in the dataset had documented administration of intravenous ondansetron before extubation. No separate untreated or placebo group was identified in the available records. Other antiemetics were not routinely prescribed, although some postoperative 'as required' antiemetic use was noted, without a consistently documented prescriber. Accordingly, this study describes the occurrence of PONV following prophylactic ondansetron administration; it does not directly compare ondansetron with an alternative or no treatment, and

its efficacy relative to a comparator cannot be inferred from these data.

DISCUSSION

In this retrospective observational study, the incidence of postoperative nausea and vomiting after general anaesthesia was 30% despite prophylactic intravenous ondansetron. This rate is broadly consistent with reported incidence figures in the wider literature on the aetiology, treatment and prevention of PONV, and illustrates the continued difficulty of controlling PONV with single-agent prophylaxis.^[8] PONV was more frequent among female patients than male patients (41.2% versus 24.2%), consistent with existing risk models and previously described patient-related risk factors for PONV.^[3,9] Because of the small sample size and incomplete documentation of some secondary variables, formal statistical risk adjustment was not possible. Risk stratification showed that 70% of patients were low risk, 24% moderate risk and 6% high risk.

These findings reflect the multifactorial aetiology of PONV and support an algorithmic approach that combines risk identification, reduction of modifiable baseline risk, and multimodal antiemetic strategies, as recommended by current consensus guidelines.^[1,2,4] An observed event rate of 30% does not, by itself, indicate that ondansetron was ineffective, since no untreated control group was available to establish a counterfactual outcome. For this reason, no claim regarding the comparative efficacy of ondansetron is made in this study. Systematic reviews of antiemetic trials have previously demonstrated the efficacy of 5-HT₃ receptor antagonists relative to placebo under controlled conditions; however, the present retrospective, single-arm dataset does not permit such a comparison to be replicated locally.^[10]

These results also illustrate the value of complete and systematic perioperative documentation, both for tracking antiemetic administration and for monitoring postoperative recovery. Allied health professionals, including anaesthesia technologists, have an important role in identifying patients at higher risk, observing for early signs of PONV, and supporting appropriate postoperative care.

This study has several limitations. It was conducted at a single centre with a relatively small sample size and relied on retrospective review of clinical records that were not always complete, particularly with regard to ondansetron dosing and additional interventions. Future studies should adopt a prospective design that incorporates a standardised risk-assessment tool, a predefined antiemetic protocol, systematic symptom monitoring, and a comparator group, in order to determine the effectiveness of ondansetron relative to alternative or combined prevention strategies.

CONCLUSION

This retrospective observational study reviewed the records of 50 patients who underwent surgery under general anaesthesia. Postoperative nausea or vomiting was documented in 30% of patients, while 70% had no documented PONV. PONV was more frequent among female patients than male patients. Most patients were classified as low risk, with a smaller proportion classified as moderate or high risk.

These findings indicate that PONV remains a clinically relevant postoperative problem even when

prophylactic intravenous ondansetron is administered. The results support the need for systematic risk assessment, accurate documentation and appropriate multimodal prevention strategies.

Because all patients in this dataset received ondansetron and no comparison group was available, this study cannot establish the independent efficacy of ondansetron in preventing PONV. Larger prospective comparative studies are required to determine the effectiveness of ondansetron and other multimodal strategies in this surgical population.

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Conflict of Interest: The authors declare no conflict of interest.

Data Availability: The data analysed in this study were derived from institutional patient records. Data sharing is subject to the institution's privacy and data-governance policies and is available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

Balaji M: Conceptualisation of the original undergraduate study, data collection, interpretation of findings and preparation of the manuscript.

A. N. Uma: Institutional supervision, academic administration, critical revision of the manuscript and final approval of the version submitted for publication.

Sathish Kumar D: Academic and clinical guidance, interpretation of anaesthesia-related aspects and critical review of the manuscript.

Anupama P: Academic supervision, critical review of the manuscript and final approval.

All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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