Comparison of the Efficacy of Metoclopramide Versus Dexamethasone for the Prevention of Postoperative Nausea Vomiting during General Anesthesia

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Authors’ contributions

This work was carried out in collaboration among all authors. Authors SA, NZ and KN were involved in conception of idea and study design. Author MA did data collection and performed bench work. THM performed the statistical analysis. Authors FL and NZ managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To evaluate the efficacy of Metoclopramide versus Dexamethasone for prevention of postoperative nausea and vomiting during general anesthesia.

Study Design: This is a Randomized control trial (RCT) study.

Setting: Study carried out at Department of Anaesthesiology, Surgical Intensive Care Unit and Pain Management, Clinic, Dow University of Health Sciences and Dr. Ruth Pfau Hospital Karachi, from December 2018 to June 2019.

Materials and Methods: 110 patients undergoing elective surgeries, who fulfilled the inclusion criteria and gave informed consent were included in the study. They were randomly assigned to
either group M or group D, with 55 patients in each group. All patients were then administered either intravenous dexamethasone (8mg) in group D or intravenous metoclopramide (10mg) in group M at the time of induction of anesthesia. The main outcome measure was postoperative nausea and vomiting, at the end of 6th hour postoperatively. The SPSS version 21 was applied to the data.

**Results:** Majority of the patients 66 (60%) were of age 35 years or less. Mean age of the patients was 35.09±11.55 years. There were more females than males, with male to female ratio being 1:1.03. Overall, in patients receiving metoclopramide, 12(21.8%) had postoperative nausea and vomiting, while in patients who received dexamethasone, only 4 (7.3%) patients had post-operative nausea and vomiting. When comparing two groups, there was statistically significant (p= 0.02) reduced postoperative nausea/vomiting among those patients who had received intravenous dexamethasone.

**Conclusion:** Intravenous dexamethasone is more effective than Metoclopramide in preventing postoperative nausea and vomiting in patients during general anesthesia.

Keywords: Dexamethasone; metoclopramide; postoperative vomiting.

1. INTRODUCTION

Postoperative common complications of anesthesia are nausea and vomiting [1]. Around one-third of patients were reported postoperative nausea and vomiting (PONV) after general anesthesia [2]. PONV leads to increased costs due to patient’s discomfort, dissatisfaction and increase hospital stays [3]. Despite improvements in anesthesia, 20-30% of patients also experience nausea and vomiting after surgery, which can lead to a significant reduction in the patient’s quality of recovery after surgery and lead to adverse effects on the patient’s health including dryness and electrolyte disturbances, bleeding, and sore throat [4,5]. Some studies show prophylactic injection of certain drugs are prevented postoperative nausea and vomiting [6]. Global drug shortages have limited access to commonly used drugs to prevent PONV such as Ondansetron and Dexamethasone [7]. Dexamethasone and Metoclopramide have been used separately for this purpose, and several studies have shown their effectiveness in reducing postoperative nausea and vomiting [8].

Worldwide Metoclopramide is a safe and inexpensive drug used to prevent postoperative nausea and vomiting [9]. It is a prokinetic drug that acts by increasing the tone of the lower esophageal sphincter. It also has an antidopaminergic action on the chemoreceptor trigger zone and at higher doses has an anti-serotonergic activity [10]. Metoclopramide is reported to be associated with Extrapyramidal side effects, but at the dose of 10 mg it is not believed to have this adverse effect [11]. Although the incidence of extrapyramidal responses associated with Metoclopramide was reported to be approximately 0.2%, these symptoms are rarely found in the anesthesia field [12].

The Society for Ambulatory Anesthesia (SAMBA) guidelines for the management of PONV recommends a prophylactic dose of Dexamethasone 4 mg to 5 mg for patients at high risk of PONV regardless of the surgical procedure [12]. A previous system review, evaluating patients undergoing several surgical procedures, did not address the effect of different doses of Dexamethasone on PONV [13]. An international study reported which Metoclopramide and dexamethasone were compared in the prevention of postoperative nausea and vomiting. The study showed that there was significant difference among the groups in the early postoperative period (0-6 hours) in the incidence of moderate to severe nausea in the dexamethasone group 9.0 % compared to the Metoclopramide group 27.2%. There was also a significant difference among the groups in incidence of vomiting, in dexamethasone was 0% compared with 18.1% in Metoclopramide group [14].

The rationale of this study was that, it helped us to control the postoperative nausea and vomiting more efficiently in the patients undergoing surgeries under general anesthesia by using the better drug. This study contributed the data in medical institute which was helpful in selecting the better treatment option. Overall it helped us to improve the quality of anesthesia and postoperative status of patients. The rational of this study was to improve the quality of treatment in our population. By improving the postoperative status of the patient it shortened the stay of the patients in hospital and patients were able to return to routine life sooner.
2. MATERIALS AND METHODS

This study was conducted in Department of Anesthesiology, Surgical Intensive Care and Pain Management Clinic, Dr. Ruth Pfau hospital Karachi, Pakistan. Patients presenting in the operation theaters of Dr. Ruth Pfau Hospital Karachi for elective surgeries and meeting the inclusion criteria were inducted in the study.

110 patients aged between 18-60 years , ASA I & II undergoing general anesthesia for procedures lasting between 60-120 minutes were included in the study. Emergency cases ,patients with known contraindications for Metoclopramide and Dexamethasone, patients with any signs of extra pyramidal motor disease, malignant hyperthermia, hepatic insufficiency, or epilepsy and surgical cases with intended or probable postoperative administration of propofol, artificial respiration, or stomach tube and use of antiemetics during the past 24 hours or a positive history of motion sickness or PONV were excluded from the study. The patients were randomly assigned to one of 2 groups of 55 patients each: Group M: received Metoclopramide (I/V 10 mg); Group D: will received Dexamethasone (I/V 8 mg). All drugs were given by anesthetist, intravenously at the time of induction of anesthesia. Induction was achieved by injection of Nalbuphine (0.15mg/kg), Propofol (2 mg/kg) and Atracurium (0.5 mg/kg) along with either Metoclopramide (10mg) or Dexamethasone (8mg) depending on the M or D group. Following tracheal intubation, anesthesia was continued with an inhalation agent (Isoflurane) while the patient breathed Oxygen (100%). Local anesthetics was not applied during surgery.

The duration of surgery was almost same (i.e. range of 60–120 minutes) for all patients. Following surgery, patients were transferred to the recovery room, where postoperative nausea and vomiting (PONV) was evaluated by anesthetists posted in recovery room. The occurrence of PONV was recorded and the final outcome in both the groups was assessed at the end of 6th hour of the surgery postoperatively. Nausea and vomiting was recorded by doctor on duty.

3. RESULTS

Mean age of the patients was 35.09 ±11.55 years. Majority of the patients 66 (60%) were presented with <35 years of age.. Mean age of patients in Group D was 35.15 ±10.98 years while mean age of patients in Group M was 35.02±12.20. Insignificant difference of age was observed in between both groups (p-value >0.05). 54(49.1%) patients were male whereas 56 (50.9%) were female. In group D 25 (45.5%) were male and 30 (55.5%) were female. In group M 29 (52.7%) were male and 26 (47.3%) were female (Table 1).

Most procedures were accomplished in 90mins (68.2%) in this study, with mean (+ SD) duration of surgery was 84.36 (+17.90) minutes. Duration of surgery of majority of cases (n=75) were ≤90 mins. In group D mean duration of surgery was 84.09 ±18.28. While in group M mean duration of surgery was 84.64 ± 17.68. Difference between two means was statistically insignificant (p-value >0.05).

Intravenous Metoclopramide was effective in preventing PONV in 43 (78.2%) patients. 12 (21.8%) patients experienced nausea and vomiting despite prophylactic administration of this drug. While, intravenous dexamethasone was effective in preventing PONV in 51 (92.7%) patients. Only 4 (7.3%) patients experienced nausea and vomiting (Table 2).When comparing two groups, there was statistically significant (p= 0.02) reduced postoperative nausea/vomiting among those patients who had received intravenous dexamethasone. Hence dexamethasone was found to be more effective in reducing postoperative nausea and vomiting compared to Metoclopramide.

4. DISCUSSION

The results of current study reveal that intravenous dexamethasone was successful in preventing PONV in 92.7% of patients while
intravenous Metoclopramide was found to be less effective in preventing PONV. After prophylactic administration of dexamethasone drug, only 7.3% patients had experienced PONV, compared to metoclopramide which was in effective in controlling PONV as 21.8% of patients experienced PONV.

Currently, serotonin receptor antagonists (ondansetron, granisetron, tropisetron, dolasetron, and ramosetron) have been used effectively in many procedure, however, these drugs were not entirely effective because most of them acted through the blockade on one type of receptor only [15]. Furthermore, their high cost precludes their use, especially in public sector hospitals [16]. Hence, alternative antiemetic prophylaxis methods have been tried with equal efficacy and more cost effectiveness. Dexamethasone has antiemetic properties in the surgical setting [17,18]. An international expert panel recommended dexamethasone, alone or as a part of multimodal regimen, for PONV prophylaxis in both adults but for children as well [19].

In this study, overall females have been associated with higher incidence compared to male patients. As previously mentioned by Fujii [20] on average, female patients suffer three times more often from PONV than men. This attributed to increase in estrogen, gonadotropin, and progesterone levels.

The duration of surgery has significant impact on PONV symptoms [21]. Sinclair et al proposed that each 30 min increase in the duration of surgery increases the incidence of PONV by 60% [22]. As shown in this study, patients who had time duration of >90min experienced more PONV (p= 0.02). Although, the exact pathophysiological background is still unknown, there is a rational biological basis. The longer an emetic stimulus (e.g. administration of volatile anesthetics and opioids) is present in the body, the more likely it is that this trigger leads to nausea and vomiting.

In our study we included ASA class I and II class only. We found no statistically significant relation between ASA and PONV among both groups. Which was comparable with the results of Gashi et al. [22]

Laiq and colleagues [23] prospectively evaluated the role of dexamethasone in 100 female patients who underwent gynaecological procedures, and found dexamethasone to effective in diminishing the incidence of postoperative nausea and vomiting from 30% and 24% respectively with Placebo and 20% and 6% with dexamethasone. It has been suggested that, dexamethasone is useful, not only for its antiemetic but also for its analgesic effects, that it should be used routinely because the adverse effects and cost appear negligible [24,25,26].

| Demographic variable (n=110) | Group M (%) | Group D (%) |
|-----------------------------|-------------|-------------|
| **Gender**                  |             |             |
| • Male                      | 29(52.7%)   | 25(45.5%)   |
| • Female                    | 26(47.3%)   | 30(55.5%)   |
| **Age (years)**             |             |             |
| • 18 - 30 years             | 11(10%)     | 14(12.72%)  |
| • 31 - 45 years             | 39(35.45%)  | 24(21.81%)  |
| • 46 - 60 years             | 8(7.27%)    | 14(12.72%)  |
| **American Society of Anesthesiologists (ASA) Status** | | |
| • ASA I                     | 43(78.2%)   | 46(83.6%)   |
| • ASA II                    | 12(21.8%)   | 9(16.4%)    |
| **Postoperative Nausea & Vomiting** | | |
| • Nausea                    | 11(20%)     | 4(7.3%)     |
| • Vomiting                  | 6(10.9%)    | 2(3.6%)     |

*Group M: Metoclopramide; Group D: Dexamethasone*

### Table 2. Comparison of dexamithasone and metoclopramide efficacy (N=110)

| Group              | Efficacy of drug | P-Value |
|--------------------|------------------|---------|
|                    | Yes             | No      |         |
| Dexamethasone (N=55)| 43 (78.2%)      | 12(21.8%)| 0.02    |
| Metoclopramide (N=55)| 51(92.7%)      | 4(7.3%)  |         |
5. CONCLUSION

It is to be concluded that intravenous dexamethasone is more effective in preventing postoperative vomiting compare to intravenous Metoclopramide. Therefore, it should be used routinely to avoid this morbidity postoperatively.

DISCLAIMER

The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

After obtaining approval from College of Physicians and Surgeons Pakistan and ethical review committee of Dow University of Health Sciences. Informed and written consent was taken from patients and explained about the potential risk and benefits of study drug.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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