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Original Research Article

Comparison of the Clinical Efficacy and Safety of Ramosetron and Ondansetron for the Treatment of Postoperative Nausea and Vomiting in Patients Undergoing Spinal Anesthesia

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Conflict of interest: Nil

Abstract:

Background: The most prevalent distressing symptom in the postoperative phase is nausea and vomiting. In order to prevent Post-Operative Nausea and Vomiting (PONV) following spinal surgery under spinal anesthesia, this study was conducted to assess the clinical efficacy and safety of prophylactic use of intravenous Ramosetron 0.3 mg with intravenous Ondansetron 4 mg. It also sought to ascertain the frequency of adverse effects with Ramosetron and Ondansetron.

Methods: In this open-label, randomized research, 80 ASA I-II patients (aged 18 to 60) received intravenous Ramosetron 0.3 mg or Ondansetron 4 mg (n = 40 of each) just prior to the onset of anesthesia. Postoperatively, the incidences of nausea, vomiting, and retching were recorded, and safety evaluations were carried out at 0, 2, 6, and 48 hours following surgery.

Results: Ramosetron had a complete response rate of 80% (32/40) while Ondansetron had a rate of 37.5% (15/40) (P 0.001). In the 48 hours following surgery, there were substantially fewer patients (5%) who needed rescue antiemetics when taking Ramosetron compared to the Ondansetron group (15%) ($P<0.05$). The incidence of side effects did not significantly differ between the two groups.

Conclusion: In patients undergoing surgery under spinal anesthesia, ramosetron (0.3mg) prevented PONV better than ondansetron (4mg).

Keywords: Ramosetron, PONV, Spinal anesthesia, Ondansetron.

Introduction

One of the most uncomfortable and upsetting side effects of anesthesia and surgery is postoperative nausea and vomiting (PONV). Many patients claim that PONV is a surgical result that should be prioritized over incisional pain. 20% to 30% of patients experience postoperative nausea and vomiting, which is defined as nausea and/or vomiting that occurs within 24 hours following surgery. Patients at high risk may experience up to 70% to 80% of these symptoms. PONV was previously thought to be a relatively inconsequential postoperative complication, but attention to complications has increased as day-care surgery becomes more popular. For all of these individuals, preventive antiemetic medication is therefore required [3].

Although there are many anti-emetic medications on the market, none of them is 100% effective in preventing PONV, and combination therapy has a lot of negative side effects [4, 5]. The first 5-HT3 receptor antagonist to be clinically effective in treating and preventing PONV was ondansetron. In contrast to other 5-HT3 antagonists, ondansetron is less selective for the 5-HT3 receptor. It has weak affinities for opioid, alpha-adrenergic, 5HT1B, and 5HT1C receptors.

Ondansetron has a good prophylactic impact on preventing vomiting, but its prophylactic effect on preventing nausea is less evident, according to systematic reviews [6]. In comparison to other 5-HT3 receptor antagonists, ramosetron is a recently created drug with a better affinity and longer duration of action.

Material and Methods

A prospective randomized open labeled active controlled parallel group clinical study was done in 80 ASA physical status I and II patients in the age range of 18 to 60 years who were scheduled for surgery under spinal anesthesia after receiving

patients' signed, informed permission. All adult patients of both sexes who meet American Society of Anesthesiologists (ASA) grade I and II criteria and fall within the age range of 18 to 60 years were included. Exclusion criteria included subjects who had a history of known drug allergies, ASA grades III and IV, H/o motion sickness or PONV, and administration of antiemetics, steroids, or psychoactive medications within 48 hours of the procedure.

The trial was conducted using traditional anaesthetic methods. Patients were randomly assigned to two groups to receive the research medications intravenously: IV Ondansetron 4 mg (Group 1) or IV Ramosetron 0.3 mg (Group 2), two to three minutes prior to the induction of anaesthesia. The postoperative vitals were measured using heart rate, non-invasive blood pressure, and breathing rate. Scores were given. 0 - If at least one of the three parameters was more than 40% of preoperative value. 2 - When all three parameters were within 20% of preoperative value. 1 - If any one or more of the three parameters were within 20-40% of preoperative value.

The following numerical rating scale was used to score PONV: Grade 0: No nausea or vomiting, Grade 1: Only mild nausea, Grade 2: One episode of vomiting, and Grade 3: Repeated episodes of vomiting in the postoperative ward. For 48 hours, blood pressure, pulse, respiration, and urine production were tracked. At 0, 2, 6, 24, and 48 hours after surgery, patients had their postoperative side symptoms and incidence of nausea, vomiting, and retching evaluated. The lack of nausea, vomiting, or retching as well as the absence of the requirement for rescue antiemetics over the 48-hour observation period are considered signs of a complete response. If there were two or more episodes of vomiting, a rescue antiemetic injection of metoclopramide 10 mg IV was administered. An knowledge of the desire to vomit is accompanied with a subjectively unpleasant sensation known as nausea. There are three different levels of nausea severity: none, mild, moderate, and severe. With the help of a verbal rating scale (VRS), the severity of the nausea was evaluated at 0, 2, 6, 24 and 48 hours.

A strong evacuation of stomach contents through the mouth is referred to as an emetic episode. Vomiting that occurs more than once in a 1 to 2 minute interval is recorded as a single episode. Complete control is given if there is no emesis, partial control for one episode, failure for more than one episode, or receiving rescue antiemetics is given as a score. For 48 hours following surgery, postoperative adverse reaction monitoring for symptoms such headache, sedation, dizziness, and diarrhoea were conducted.

Continuous data, expressed as the mean ± SD, were compared using the 'Z' test. For qualitative data, X^2 (Chi-square) test was applied. The level of significance was taken as $P>0.05$ - not significant, $P<0.05$ – significant, and $P<0.01$ – highly significant.

Results

Regarding age, gender, surgery length, kind, ASA status, and block level, there was no discernible difference between the two groups. A post-operative vital score of 2 was achieved by all study participants in both groups, indicating that all three indicators (heart rate, non-invasive blood pressure, and respiration rate) were within 20% of the preoperative value.

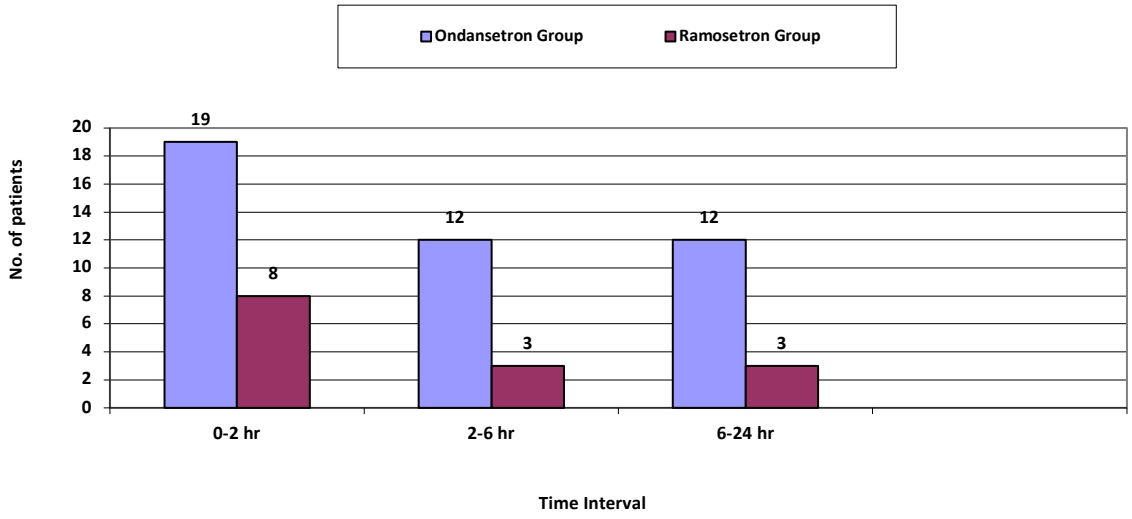

Figure 1: Comparison of Nausea grading among both groups

At 0, 2, 6, and 24 hours, the Ramosetron group had significantly lower nausea scores than the Ondansetron group.

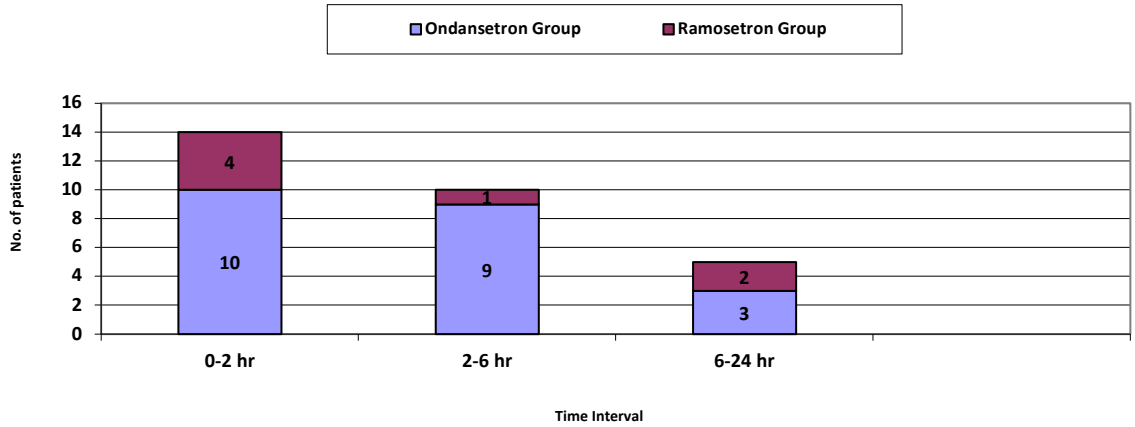

Figure 2: Comparison of vomiting episodes among both groups

In contrast to 75% of the patients in the Ondansetron group, 90% of the patients in the Ramosetron group did not have vomiting within the first two hours following surgery. Additionally, between 2 and 6 hours after surgery, the Ramosetron group experienced much less vomiting than the Ondansetron group.

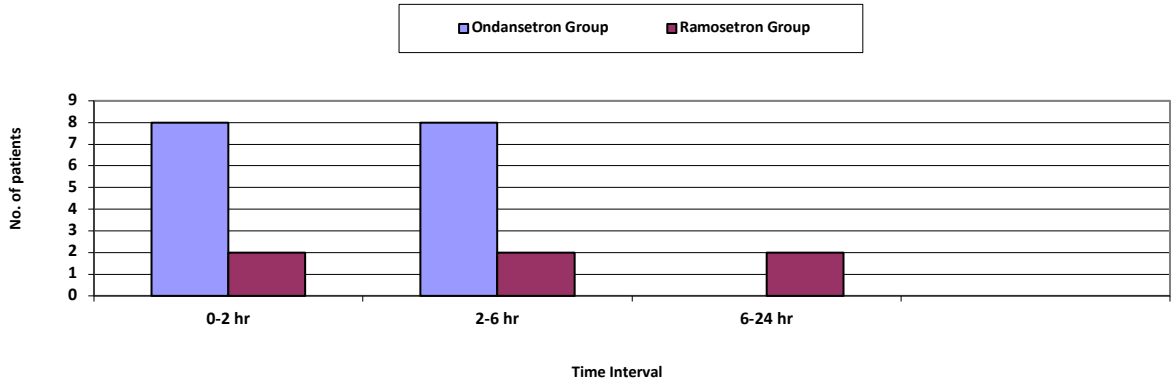

Figure 3: Comparison of Retching among both groups

Between 0-2 hours and 2-6 hours postoperatively, the incidence of retching was significantly lower in the Ramosetron group compared to the Ondansetron group.

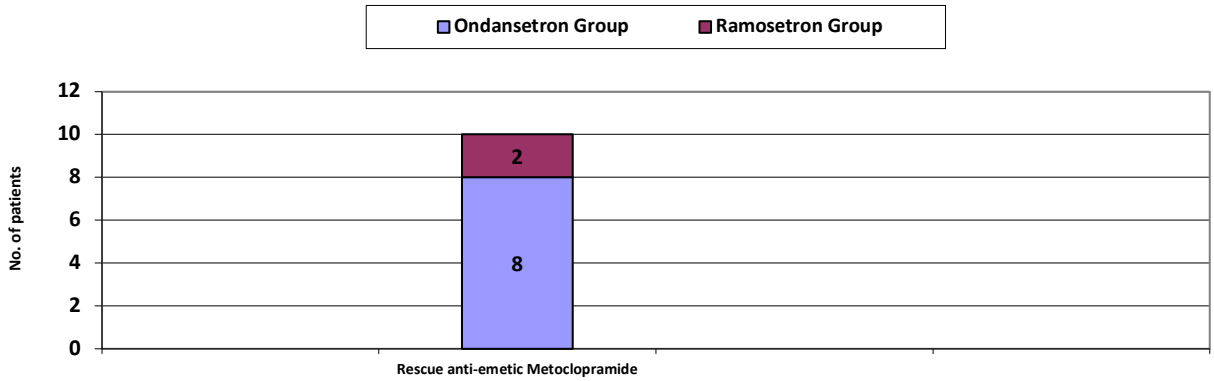

Figure 4: Rescue anti-emetic used for both groups

In the 48 hours following surgery, there were substantially fewer patients (5%) who needed rescue antiemetics when taking Ramosetron compared to the Ondansetron group (15%) (P<0.05).

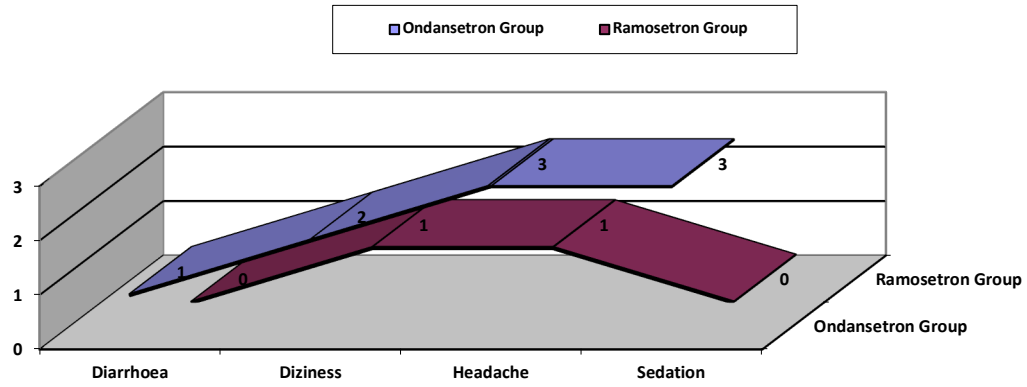

Figure 5: Comparison of adverse effects among both groups

Between the two groups, there was no statistically significant difference in the incidence of negative effects. One patient in Group I reported having diarrhea, two reported feeling lightheaded, three had headaches, and three reported feeling sedated. One patient in group II suffered headaches, while another had vertigo. Following surgery, all of the patients in the Ondansetron group experienced considerable pain, while just two of the 38 patients in the Ramosetron group experienced mild pain. Regarding the degree of pain, there was no statistically significant difference between the two groups.

Table 1: Comparison of overall efficacy of the drugs among both groups

Overall Efficacy of the Drugs	Ondansetron Group (n=40)		Ramosetron Group (n=40)	
Complete Response	15	37.5%	32	80.0%
Nausea	11	27.5%	3	7.5%
Vomiting	8	20.0%	3	7.5%
Anti-emetics	6	15.0%	2	5.0%
p-value = 0.002				

Ramosetron demonstrated statistically significant efficacy (P<0.05) when comparing the total efficacy of the medications between the two groups. Eleven patients in the ondansetron group reported feeling nauseous, eight reported vomiting, and six needed a rescue antiemetic. Three patients in the ramosetron group reported feeling queasy, three patients vomited, and two patients needed rescue antiemetics. When compared to the Ondansetron group (37.5%), the complete response was much higher in the Ramosetron group (80%).

Discussion

The most frequent and uncomfortable side effects that occur after anesthesia and surgery are pain and emesis. A common complication for both inpatients and outpatients after almost all sorts of surgical operations, PONV has been described as a "big 'little problem"[4]. Increased postoperative bleeding, wound dehiscence, pulmonary aspiration of stomach contents, fluid and electrolyte imbalance, dehydration, delayed hospital release, unanticipated hospital hospitalization, and decreased satisfaction in surgical patients are frequently related with it. Without prophylaxis, PONV is a substantial and frequent source of serious issues [7]. Ondansetron, whose antiemetic efficacy has been well established in chemotherapy-induced emesis and the prevention and treatment of PONV, has been the subject of the majority of research on the 5-HT3 receptor antagonists[7]. A recently created selective 5-HT3 receptor antagonist is called ramosetron. When compared to previous 5-HT3 receptor antagonists, it has a much higher binding affinity for 5-HT3 receptors and a slower rate of dissociation from receptor binding, leading to more strong and prolonged receptor antagonizing effects[7].

All the variables in our study were evenly distributed between the two groups, and all patients experienced the same preoperative fasting, premedication, balanced anesthesia, and postoperative care. Age, weight, surgery time, procedure type, and postoperative analgesia were all similar between the groups.

The early postoperative period can be affected by the incidence of emesis since tachycardia and hypertension are symptoms of pain. To measure the haemodynamic changes during surgery and in the

postoperative period, a scoring system was adopted in our study. Both during the intraoperative time and the postoperative period, there was no difference in the haemodynamic alterations between the two groups compared to the preoperative value. There was little difference between the groups in terms of the postoperative pain levels or the need for analgesics.

In a research by Lee JW et al., total response, incidence of nausea/vomiting, and rescue anti-emetic during the first two hours and the first twenty-four hours following surgery were not significantly different. The Ramosetron group had a considerably higher complete response (98.3%) than the Ondansetron group (86.7%) 24–48 hours following surgery.

The usage of rescue antiemetics during the postoperative 24-48 hours did not differ[6]. In patients at high risk for PONV following total knee replacement, Hahm TS et al. assessed the efficacy of Ramosetron and Ondansetron as prophylactic anti-emetic medications. Within the first two hours following surgery, there were no differences between the groups. In comparison to the Ondansetron group, more patients in the Ramosetron group experienced a full recovery between 2 and 48 hours[8].

In our trial, the Ramosetron group had a full response rate following surgery that was much greater (80%) than the Ondansetron group's (37.5%). Compared to 20% of participants in the Ondansetron group, only 7.5% of Ramosetron patients had vomiting. When compared to the Ondansetron group, the Ramosetron group experienced considerably less vomiting at 2–6 hours. In comparison to the Ondansetron group (15%), the Ramosetron group (5%) required considerably less rescue antiemetic (P=0.042).

Ramosetron group experienced retching less frequently than Ondansetron group. In the Ramosetron group, 95% of patients reported no retching, compared to 80% in the Ondansetron group. This finding was significant between 0 and 2 hours (P=0.043) and 2 and 6 hours (P=0.042). In the Ramosetron group, 82.5% reported "no nausea," compared to 52.5% in the Ondansetron group. At 0–2, 2–6, and 6–24 hours, the incidence of nausea was substantially lower in the Ramosetron group than in the Ondansetron group (P=0.012, 0.023, and 0.035, respectively).

In a trial including 162 patients undergoing gynecological surgery, Kim SI et al. came to the conclusion that there were no statistically significant differences between Ramosetron, Ondansetron, and placebo in the occurrence of adverse events. Headache and dizziness were the most frequently reported adverse effects [7]. In our investigation, there was no discernible difference in the side effects between the two groups.

Ramosetron, which has a lower side effect profile than Ondansetron, was therefore more successful in reducing PONV in patients undergoing spinal anesthetic for surgery.

Conclusion

When compared to intravenous Ondansetron 4mg, intravenous Ramosetron 0.3mg, given right before induction, dramatically reduced the incidence and intensity of nausea, retching, and vomiting as well as the requirement for rescue antiemetic medication. Between the two groups, there was no discernible difference in the occurrence of adverse effects or haemodynamic abnormalities (heart rate, blood pressure, and respiration rate). In neither group were any major issues found. In patients undergoing surgery under spinal anesthesia, prophylactic medication with Ramosetron is more successful and secure than ondansetron in preventing PONV.

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