Section: Anaesthesiology

Original Research Article

A STUDY TO COMPARE ONDANSETRON AND DEXAMETHASONE FOR PREVENTION OF INTRAOPERATIVE NAUSEA AND VOMITING DURING CESAREAN DELIVERY UNDER SUBARACHNOID BLOCK

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ABSTRACT

Background: Intraoperative nausea and vomiting (IONV) are frequent and distressing complications during cesarean delivery performed under subarachnoid block. These symptoms can compromise maternal comfort, surgical conditions, and overall patient satisfaction. Effective prophylaxis is therefore essential. Ondansetron and dexamethasone are commonly used antiemetics, but comparative evidence during cesarean delivery under spinal anesthesia remains limited.

Materials and Methods: This prospective, randomized, double-blind, placebo-controlled study was conducted on 100 term parturients undergoing elective cesarean delivery under spinal anesthesia. Participants were randomly allocated into three groups: placebo (normal saline), dexamethasone 8 mg IV, or ondansetron 4 mg IV administered 20 minutes prior to spinal anesthesia. The primary outcomes were the incidence and severity of nausea, retching, and vomiting. Secondary outcomes included hemodynamic changes, ephedrine requirement, sedation scores, need for rescue antiemetics, and neonatal APGAR scores.

Results: Ondansetron significantly reduced the incidence of nausea (18.2%), retching (9.1%), and vomiting (3.0%) compared with dexamethasone and placebo ($p < 0.05$). Dexamethasone demonstrated moderate efficacy compared with placebo but was less effective than ondansetron. The severity of nausea and requirement for rescue antiemetics were lowest in the ondansetron group. Hemodynamic parameters, sedation scores, and neonatal APGAR scores at 1 and 5 minutes were comparable across all groups.

Conclusion: Ondansetron 4 mg IV is superior to dexamethasone 8 mg IV and placebo for preventing intraoperative nausea and vomiting during cesarean delivery under spinal anesthesia. Dexamethasone offers moderate benefit and may serve as an alternative or adjunct. Both agents are safe for maternal and neonatal outcomes.

Keywords: Intraoperative Nausea and Vomiting, Ondansetron, Dexamethasone, Cesarean Section, Spinal Anesthesia.

INTRODUCTION

Cesarean delivery under spinal anesthesia has become a standard and widely accepted anesthetic technique due to its rapid onset, dense sensory blockade, reduced maternal morbidity, minimal drug transfer to the fetus, and favorable neonatal outcomes. Despite these advantages, intraoperative

nausea and vomiting (IONV) remain a frequent concern, particularly during uterine manipulation, peritoneal traction, and visceral stimulation. Reported incidence rates range between 40% and 70% in the absence of prophylactic antiemetic therapy, emphasizing the need for effective preventive strategies.[1,2]

The etiology of IONV is multifactorial. Pregnancy-related physiological changes such as delayed gastric emptying, increased progesterone levels, and heightened chemoreceptor trigger zone sensitivity predispose parturients to nausea and vomiting. Spinal anesthesia-induced sympathetic blockade can cause hypotension and cerebral hypoperfusion, further activating emetic pathways. Surgical factors, including uterine exteriorization and traction, also play a significant role. Effective prevention of IONV improves maternal comfort, optimizes surgical conditions, and enhances overall patient satisfaction.[3,4]

Various pharmacological agents have been studied for IONV prophylaxis. Dexamethasone, a corticosteroid with proven antiemetic properties, is thought to exert its effect through central inhibition of prostaglandin synthesis, reduction of serotonin release, and anti-inflammatory action. It is inexpensive, widely available, and has a long duration of action. Ondansetron, a selective 5-HT3 receptor antagonist, blocks serotonin-mediated emetogenic pathways both centrally and peripherally and is widely used due to its strong efficacy and favorable safety profile in pregnancy.[5]

This study was undertaken to compare the efficacy of ondansetron and dexamethasone in preventing IONV during cesarean delivery under spinal anesthesia at Gandhi Medical College, Bhopal, while also evaluating maternal hemodynamic stability and neonatal outcomes.

MATERIALS AND METHODS

Study Design: A prospective, randomized, double-blind, placebo-controlled clinical trial was conducted in the Department of Anesthesiology, Gandhi Medical College and Hamidia Hospital, Bhopal.

Participants: A total of 100 term parturients scheduled for elective cesarean delivery were enrolled after obtaining written informed consent.

Inclusion Criteria

- Age 18–40 years
- Singleton term pregnancy
- ASA physical status I–II
- Planned elective cesarean section under spinal anesthesia

Exclusion Criteria

- Known allergy to ondansetron or dexamethasone
- Pre-existing nausea or vomiting
- Pregnancy-induced hypertension or diabetes mellitus
- History of motion sickness or gastrointestinal disease
- Use of antiemetics or steroids within 24 hours prior to surgery
- Conversion to general anesthesia
- Randomization and Blinding

Participants were randomly allocated into three groups:

- Group I (Placebo): 2 ml normal saline IV
- Group II (Dexamethasone): 8 mg IV diluted to 2 ml
- Group III (Ondansetron): 4 mg IV diluted to 2 ml

Randomization was computer-generated, and both patients and anesthesiologists were blinded to group allocation.

Anaesthetic Technique: Spinal anesthesia was administered in the sitting position using a 25G Quincke needle at the L3–L4 or L4–L5 interspace with 12.5 mg of 0.5% hyperbaric bupivacaine. Standard monitoring included ECG, non-invasive blood pressure, pulse oximetry, and respiratory rate.

Hypotension was defined as a fall in systolic blood pressure greater than 20% from baseline and was treated with intravenous fluids and ephedrine boluses (6 mg) as required.

Outcome Assessment

Primary Outcomes

Incidence of nausea, retching, and vomiting

Severity of nausea using a numeric rating scale (0–10)

Secondary Outcomes

Incidence of hypotension

Total ephedrine requirement

Sedation score (6-point scale)

Requirement of rescue antiemetic (promethazine 25 mg IV)

Neonatal APGAR scores at 1 and 5 minutes.

RESULTS

All 100 participants completed the study: 34 in the placebo group, 33 in the dexamethasone group, and 33 in the ondansetron group.

Table 1: Demographic Characteristics of Study Participants

Parameter	Placebo (n = 34)	Dexamethasone (n = 33)	Ondansetron (n = 33)	p value
Age (years)	26.8 ± 3.9	27.1 ± 4.2	26.5 ± 4.0	>0.05
Weight (kg)	62.4 ± 6.1	63.1 ± 5.8	62.9 ± 6.3	>0.05
ASA I / II	28 / 6	27 / 6	26 / 7	>0.05

Values expressed as mean ± SD or number.

Table 2: Incidence of Intraoperative Nausea and Vomiting (IONV)

Outcome	Placebo (n = 34)	Dexamethasone (n = 33)	Ondansetron (n = 33)	p value
Nausea	20 (58.8%)	12 (36.4%)	6 (18.2%)	<0.05
Retching	14 (41.2%)	8 (24.2%)	3 (9.1%)	<0.05
Vomiting	10 (29.4%)	5 (15.2%)	1 (3.0%)	<0.05
Rescue antiemetic required	12 (35.3%)	6 (18.2%)	2 (6.1%)	<0.05

Table 3: Severity of Nausea (Numeric Rating Scale)

Nausea Score	Placebo (n = 34)	Dexamethasone (n = 33)	Ondansetron (n = 33)
Mean score	4.6 ± 1.8	2.9 ± 1.4	1.3 ± 0.9

Table 4: Hemodynamic Parameters

Parameter	Placebo (n = 34)	Dexamethasone (n = 33)	Ondansetron (n = 33)	p value
Hypotension	15 (44.1%)	14 (42.4%)	13 (39.4%)	>0.05
Ephedrine requirement (mg)	9.2 ± 4.1	8.8 ± 3.9	8.5 ± 3.6	>0.05

Table 5: Sedation Scores and Neonatal Outcomes

Parameter	Placebo (n = 34)	Dexamethasone (n = 33)	Ondansetron (n = 33)	p value
Sedation score	2.1 ± 0.6	2.0 ± 0.5	2.0 ± 0.4	>0.05
APGAR at 1 min	8.1 ± 0.6	8.2 ± 0.5	8.3 ± 0.5	>0.05
APGAR at 5 min	9.6 ± 0.4	9.7 ± 0.3	9.7 ± 0.3	>0.05

DISCUSSION

Intraoperative nausea and vomiting remain significant challenges during cesarean delivery under spinal anesthesia, with reported incidences as high as 70% in the absence of prophylaxis. The present study confirms the high baseline incidence of IONV in the placebo group and demonstrates that prophylactic antiemetic administration significantly reduces these distressing symptoms.[6,7]

The findings of this study clearly indicate that ondansetron provides superior protection against IONV compared with dexamethasone. The marked reduction in nausea, retching, vomiting, and rescue antiemetic use in the ondansetron group can be explained by its mechanism of action as a selective 5-HT3 receptor antagonist. Serotonin release from enterochromaffin cells and activation of central emetic pathways play a key role in nausea and vomiting during spinal anesthesia, particularly during uterine manipulation and peritoneal traction. By blocking these receptors both centrally and peripherally, ondansetron effectively suppresses the emetic reflex.[8]

Dexamethasone demonstrated moderate efficacy in reducing IONV when compared with placebo, consistent with previous studies. Its antiemetic effect is believed to result from inhibition of prostaglandin synthesis, decreased serotonin release, and reduction of inflammatory mediators. Although dexamethasone was less effective than ondansetron as a single agent, its long duration of action, low cost, and minimal side effects make it an attractive option, particularly in resource-limited settings or as part of combination antiemetic therapy.[9]

Importantly, neither ondansetron nor dexamethasone had a significant impact on maternal hemodynamics. The incidence of hypotension and ephedrine requirements were comparable across all groups, suggesting that the observed reduction in IONV was independent of blood pressure changes. This is clinically relevant, as hypotension is a major contributor to nausea and vomiting during spinal anesthesia. The similar hemodynamic profiles across groups strengthen the conclusion that ondansetron's antiemetic effect is pharmacological rather than secondary to improved cardiovascular stability.[10]

Neonatal outcomes, assessed using APGAR scores at 1 and 5 minutes, were comparable in all three groups. This finding supports the safety of both ondansetron and dexamethasone when administered in standard prophylactic doses during cesarean delivery. The absence of increased sedation or adverse neonatal effects further reinforces their suitability for obstetric anesthesia.

The reduced requirement for rescue antiemetics in the ondansetron group is of particular clinical importance, as it reflects improved intraoperative comfort and decreased drug exposure. Improved maternal experience during cesarean delivery can have positive psychological implications and enhance overall satisfaction with anesthesia care.

Despite its strengths, this study has certain limitations. The sample size was relatively small and conducted at a single center, which may limit generalizability. Additionally, combination therapy using ondansetron and dexamethasone was not evaluated and may offer enhanced prophylaxis. Future studies with larger sample sizes and evaluation of combination regimens could provide further insight into optimal antiemetic strategies.

CONCLUSION

Ondansetron 4 mg IV is superior to dexamethasone 8 mg IV and placebo in preventing intraoperative nausea and vomiting in parturients undergoing cesarean delivery under spinal anesthesia. Dexamethasone offers moderate efficacy and may be considered a useful alternative or adjunct. Both drugs are safe for maternal and neonatal outcomes.

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