



INCIDENCE OF HYPOTENSION IN LSCS WITH INTRATHECAL FENTANYL –LOW DOSE BUPIVACAINE COMBINATION AND WITH BUPIVACAINE ALONE: OBSERVATIONAL STUDY

Anaesthesiology

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KEYWORDS

INTRODUCTION

Spinal anesthesia is the most common technique of regional anesthesia for cesarean section with minimal maternal and neonatal complications as compared to general anesthesia which is associated with difficult airway and risk of aspiration. However, hypotension during spinal anesthesia for cesarean section is the most common complication associated with nausea and vomiting, altered mental status and risk of aspiration.

Recent systemic review on definition of hypotension showed that systolic blood pressure less than 90 mmHg or systolic blood pressure less than 30% of the baseline is the accepted value. Bupivacaine is the most commonly used local anesthetic agent in spinal anesthesia for cesarean section. The dose of bupivacaine for spinal anesthesia is 7.5-10 mg for pregnant mothers to avoid high and extensive block due to physiologic and mechanical effects of pregnancy. Even with standard doses of bupivacaine for pregnant lady, there are evidences of severe hypotension and related maternal and neonatal complications.

Different adjuvant like Opioids and non-opioids have been tried to improve intraoperative anesthesia, and to prolong postoperative analgesic duration.⁽¹⁾ Fentanyl, a lipophilic opioid, has rapid onset of action after intrathecal administration. After intrathecal administration, fentanyl diffuses into epidural space and subsequently into the plasma, suggesting that it acts not only through spinal opioid receptors but also systemically. Delayed respiratory depression is less likely associated with fentanyl, as it does not reach to 4th ventricle in sufficient concentrations. Though high dose of bupivacaine provides sensory and motor block, it is also associated with high incidence of hypotension and poor neonatal outcomes. On the other hand, low dose bupivacaine is associated with inadequate anesthesia despite low incidence of hypotension.

Low dose bupivacaine with fentanyl provides adequate anesthesia with stable maternal hemodynamic and neonatal outcomes. However, there are discrepancies on the efficacy of low dose bupivacaine with fentanyl. Therefore, we have conducted this observational study to observe the intraoperative hypotension in emergency and elective LSCS cases with intrathecal fentanyl - low dose bupivacaine combination and bupivacaine alone.

The Study Objectives

- Primary objective is to observe intraoperative hemodynamic parameters like blood pressure in LSCS with intrathecal fentanyl-low dose bupivacaine combination and with bupivacaine alone.
- To determine time, onset and duration of sensory and motor block.
- To determine any adverse effect (nausea, vomiting, urinary retention).

METHODOLOGY

An Observational study conducted at Tertiary care hospital during the period between February 2021 to July 2022. Sample size is estimated by using the difference in hypotension in LSCS with intrathecal fentanyl low dose bupivacaine combination and with bupivacaine alone from the study of Grant w. susser, cascio M. Moses M and zakowski using these values at 99% confidence limit and 90% power. Total of 60 cases was obtained which was further divided equally in Two group.

Inclusion Criteria

- Patient who has given written informed consent
- Age 20–37 years
- ASA I and II
- **Exclusion Criteria**
- Patient who has not given written informed consent
- Age < 20 years & > 37 years
- Patients requiring on table supplementation with general anesthesia
- ASA III and IV

Detailed procedure of study: After getting approval from the ethics committee. A total of 60 patients who underwent cesarean section were taken up for the study. The age of the patients ranged from 20-37 years weighing 50-80 kg and height ranging from 150-170cms. All patients were thoroughly examined preoperatively. An initial preoperative counselling and reassurance to gain confidence of the patient was done. Inj. Ondansetron 4 mg was given intravenously as premedication 30 minutes before surgery and patients were randomized into 2 groups of 30 each.

Group A – 30 patients received 2 ml of 0.5% hyperbaric bupivacaine (10mg)
Group B – 30 patients received 1.5ml of 0.5% Bupivacaine (7.5mg) with 0.5 ml fentanyl (25 µg)

The final volume of the injected solution is 2 ml on both groups.

In the assessment room, vital parameters like pulse rate, blood pressure, respiratory rate and baseline investigations like hemoglobin, urine analysis for albumin and sugar, blood sugar, urea and creatinine and ECG were checked. Though examination of all the systems and airway assessment was done. Visual Analog scale (VAS) was explained to the patient. Patients were advised nil per oral 6 hours before the procedure. The noninvasive blood pressure monitor, pulse oximeter and electrocardiogram leads were connected to the patient. Preoperative baseline systolic and diastolic blood pressure, pulse rate, respiratory rate and oxygen saturation was recorded. The L3- L4 interspaces was identified and 25G Quincke Babcock spinal needle was introduced in this space through midline approach.

Sensory block was assessed by loss of sensation to pinprick using 21G sterile needle bilaterally along the mid-clavicular line. Onset of sensory block was taken as the time from intrathecal injection to loss of pinprick sensation at T 10 dermatome.

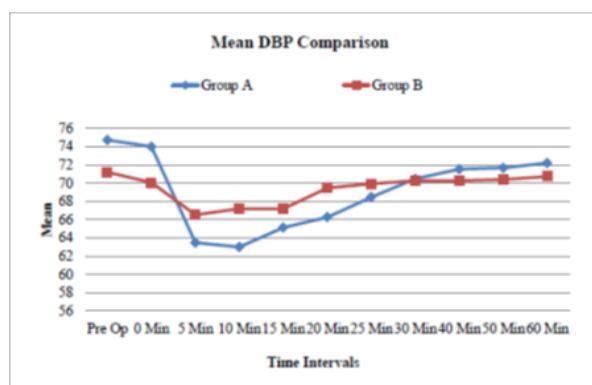
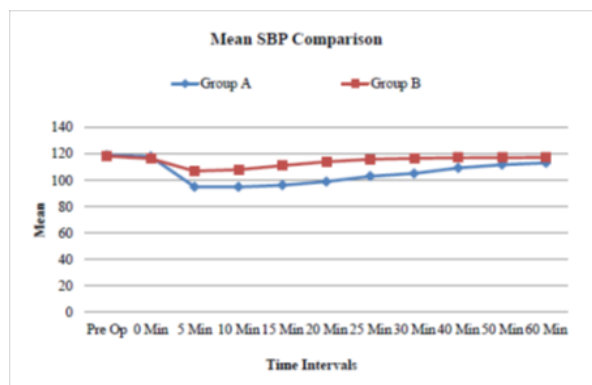
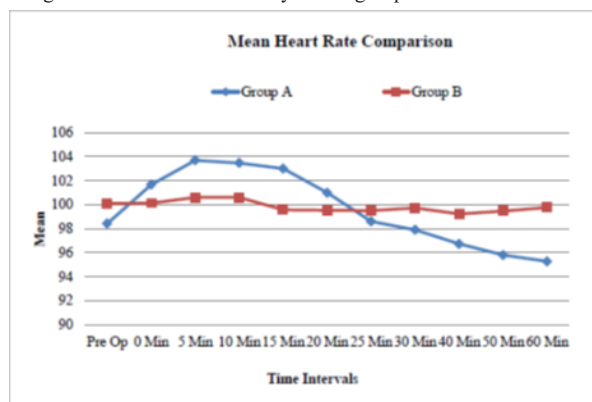
Thereafter, motor block was assessed every 15 minutes till it reached Bromage score or 0. Duration of motor block was taken as time from subarachnoid injection to return of Bromage score to 0. Vital signs and side effects.

OBSERVATION & RESULTS

In present study the mean age (years) of the group A was 25.53 ± 4.02 years and the group B was 26.8 ± 3.84 years. From the P-Value. There was no significant difference in age distribution between two groups. The height (cm) of the group A was 158.53 ± 4.83 cm and the group B was 157.7 ± 4.16 cm. There was no significant difference in height distribution between two groups. The mean weight of the group A was 61.8 ± 5.49 Kg. and the group B was 62.93 ± 5.47 Kg. There was no significant difference in weight distribution.

In present study, the mean duration of surgery of the group A was 54.90 ± 4.92 minutes and the group B was 54.77 ± 3.95 minutes. There was no significant difference in mean duration of surgery between two groups. The mean time to onset at T10 was 98.67 ± 9.72 sec in Group A and 101.77 ± 7.51 sec in Group B. There was no statistically significant difference noted. The mean time to achieve Grade I motor block on Bromage scale was 151.77 ± 12.29 seconds in group A and 155.70 ± 8.875 seconds in group B which was statistically insignificant. The addition of fentanyl intrathecally had no effect on the onset of bupivacaine induced sensory and motor block.

In present study, the incidence of hypotension was 73.33% in group A and 33.33% in group B. This was statistically significant. The incidence of hypotension was significantly reduced by fentanyl- low dose bupivacaine combination. The low dose bupivacaine-fentanyl combination significantly reduced the mephentermine requirements to treat hypotension. Intrathecal fentanyl improved the quality of surgical anaesthesia. The addition of fentanyl significantly prolonged the time to sensory regression to L1. The addition of fentanyl allowed low dose bupivacaine to prolong the duration of effective post operative. The incidence of side effects was limited to mild pruritus and grade I sedation in the fentanyl added group.



DISCUSSION

In present study, the mean time to onset at T10 was 98.67 ± 9.72 sec in Group A and 101.77 ± 7.51 sec in Group B. Here, no statistically significant difference was noted. This correlates with the study done by Singh H, et al⁽²⁾ who concluded that addition of intrathecal fentanyl

25µg to hyperbaric bupivacaine did not hasten the onset of sensory block. Roussel JR and Heindel LS⁽³⁾ also concluded that addition of fentanyl 25µg to 0.5% hyperbaric bupivacaine did not enhance the onset of sensory block.

The median of the upper limit of sensory block was T6 in Group A and T4 in Group B. The addition of fentanyl to smaller dose of subarachnoid hyperbaric bupivacaine provided adequate level of sensory block. This correlated with the study of Kuusniemi KS, et al⁽⁴⁾ who demonstrated a sensory block height of greater than T7. They did not observe an increase in height of sensory block by the addition of 25µg fentanyl to intrathecal hyperbaric bupivacaine

In present study, onset of Motor block The time to achieve Grade I motor block on Bromage scale was 151.77 ± 12.29 seconds in group A and 155.70 ± 8.875 seconds in group B which was statistically insignificant. This observation correlated with the study done by Singh H, et al⁽²⁾ who demonstrated that intrathecal fentanyl does not enhance the onset of bupivacaine induced motor block. Abate SM, et al⁽⁵⁾ showed that addition of intrathecal fentanyl 25µg to hyperbaric bupivacaine did not hasten the onset of motor block.

In present study, the mean duration of effective analgesia was 186.23 ± 5.1 min in Group A and 219 ± 6.65 min in group B which was highly significant statistically. This correlated with the study of Singh, et al⁽²⁾ who demonstrated that only fewer patients receiving fentanyl 25µg with 0.5% bupivacaine demanded pain relief in the early postoperative period when compared to patients receiving bupivacaine alone intrathecally. Similar results were observed by Fernandez Galinski D, et al⁽⁷⁾ and Uppal V, et al⁽⁶⁾

Belzarena SD⁽⁸⁾ showed that the combination of bupivacaine and low dose fentanyl provide excellent surgical anesthesia (100%) when compared to bupivacaine used alone (87%) in spinal anesthesia for cesarean section. Siddik-Sayyid SM, et al⁽⁹⁾ who reported that spinal anesthesia with 0.5% bupivacaine and 12.5 µg fentanyl provided better quality of anesthesia when compared to supplementation with same dose of fentanyl intravenously for cesarean section. Similar observation was found in our study.

Tejwani GA, et al⁽¹⁰⁾ and Hanoura SE, et al⁽¹¹⁾ shown that the combination of opioids and local anesthetics are synergistic for somatic analgesia and that intrathecal opioids markedly enhanced analgesia from sub therapeutic dose of intrathecal local anesthetics. Similar observation was found in our study.

In our study, the incidence of hypotension was 73.33% in group A and 33.33% in group B. This was statistically significant and could be attributed to the lower dose of bupivacaine used in the group. Our study confirmed the fact that the decrease in sympathetic efferent activity after spinal anesthesia with bupivacaine was dose related and that intrathecal fentanyl caused neither by itself nor in combination with bupivacaine, any further depression of efferent sympathetic activity. Similar results were observed in other studies.⁽¹²⁻¹⁵⁾

Venkata HG, et al⁽¹⁶⁾ in their study confirmed that the low dose of 7.5 of hyperbaric bupivacaine 0.5% combined with 25µg fentanyl produce better analgesia and stable hemodynamics than the conventional dose of 10 mg of hyperbaric bupivacaine.

The mean mephentermine requirements were 12mg with group A and 3 mg in group B. This is highly significant. Ben David B, et al⁽¹³⁾ confirms that the mean mephentermine requirements were 2.3mg with the combination of 5mg isobaric bupivacaine and 25µg fentanyl but it was 2.8mg with 10mg bupivacaine when used intrathecally for cesarean section. Kangas Saarala T, et al⁽¹⁷⁾ has concluded that small doses of mephentermine given to correct maternal hypotension under spinal anesthesia have only short lived effect on the fetal central nervous system.

Pruritus occurred in 8 patients in group B, its incidence being 33.3%. It was mild and occurred most commonly in the face. Our study correlated with the view of Hamber EA and Viscomi CM1 that pruritus being a common complication with intrathecal fentanyl. Similarly other study also reported.^(4,18)

The occurrence of excellent surgical anesthesia in patients receiving fentanyl could be the cause for absence of nausea in group B. This correlates with the study conducted by Manullang TR, et al⁽¹⁹⁾ which

concludes that intrathecal fentanyl as a part of spinal anesthetic for cesarean delivery was superior to intravenous ondansetron for preventing intraoperative nausea.

CONCLUSION

This study confirms that the combination of intrathecal fentanyl 25µg with 7.5mg hyperbaric bupivacaine 0.5% reduces the incidence of hypotension and mephentermine requirements, produces excellent surgical anesthesia, and prolongs the duration of effective analgesia and minimal side effects when compared to 10mg hyperbaric bupivacaine 0.5% in lower segment cesarean section without significant effects on the neonatal outcome.

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