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Original Research Article

STUDY OF COMPARISON OF INTRATHECAL BUPIVACAINE PLUS MIDAZOLAM VS BUPIVACAINE ALONE FOR POSTOPERATIVELY ANALGESIA IN THE PATIENTS OF CAESAREAN DELIVERY

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Abstract

Background: Caesarean section is associated with moderate-to-severe postoperative pain, which can influence postoperative recovery and patient satisfaction as well as breastfeeding success and mother-child bonding. This study was designed to compare the intrathecal bupivacaine plus midazolam vs bupivacaine alone for postoperatively analgesia in the patients of caesarean delivery.

Material and Methods: Present study was single-center, comparative, interventional study, conducted in pregnant women, 19-35 years age, ASA grade I/II, posted for elective Caesarean section. 60 pregnant women were randomly selected and divided by alternate enrollment, into group B - 10 mg bupivacaine & group BM - 10 mg bupivacaine with 2 mg of preservative-free midazolam.

Results: Baseline characteristics of pregnant women such as age, weight, height, ASA grade & duration of surgery (min) were comparable in both groups & difference was not statistically significant. In present study early onset time of sensory block, reduced time to achieve complete sensory block & prolonged duration of effective analgesia was noted in group BM as compared to group B, and the difference was statistically significant. Complications such as bradycardia, hypotension, nausea and vomiting were noted in present study. Group B had slightly increased number of complications than group BM, difference was not statistically significant.

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Conclusion: In present study, for caesarean section intrathecal bupivacaine plus midazolam had earlier onset of sensory block, prolonged postoperative analgesia with less complications compared to bupivacaine alone.

Keywords: intrathecal, bupivacaine, midazolam, postoperative analgesia

Introduction

Caesarean section is associated with moderate-to-severe postoperative pain, which can influence postoperative recovery and patient satisfaction as well as breastfeeding success and mother-child bonding.[1] Spinal anaesthesia is the preferred means for LSCS due to high efficiency, minimal neonatal depression, awake mother and lesser incidence of aspiration, Among the local anesthetics, 0.5% hyperbaric bupivacaine is the most commonly used drug for spinal anesthesia. Bupivacaine, an amide type of local anesthetic, has high potency, slow onset (5–8 minutes) and long duration of action (1.5–2 hours).[2,3] For patients undergoing elective caesarean section performed under neuraxial anaesthesia, recommendations include intrathecal morphine 50–100 μg or diamorphine 300 μg administered pre-operatively; paracetamol; non-steroidal anti-inflammatory drugs; and intravenous dexamethasone administered after delivery. If intrathecal opioid was not administered, single-injection local anaesthetic wound infiltration; continuous wound local anaesthetic infusion; and/or fascial plane blocks such as transversus abdominis plane or quadratus lumborum blocks are recommended.[4]

Bupivacaine is the most commonly employed local anaesthetic for subarachnoid block, but has limited duration of action, therefore ideal adjuvants that can be used with bupivacaine for stable intraoperative conditions and prolonging the post-operative analgesia with minimal side effects are being investigated.[5] This study was designed to compare the intrathecal bupivacaine plus midazolam vs bupivacaine alone for postoperatively analgesia in the patients of caesarean delivery.

Material and Methods

Present study was single-center, comparative, interventional study, conducted in department of anesthesiology, at Belagavi Institute of Medical Sciences, Belagavi, Karnataka, India. Study duration was of 3 months (December 2021 to Feb 2022). Study was approved by institutional ethical committee.

Inclusion criteria

- Pregnant women, 19-35 years age, ASA grade I/II, posted for elective Caesarean section, willing to participate in study

Exclusion criteria

- Evidence of fetal compromise and anomalies.
- Bad obstetric history and obstetric complications in present pregnancy.

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- Medical disorders such as heart disease, renal disease, liver disease, any psychiatric illness.
- Contraindication to spinal anaesthesia.

Study was explained in local language & written informed consent was taken. 60 pregnant women were randomly selected and divided by alternate enrollment, into group B & group BM.

1. Group B - 10 mg bupivacaine
2. Group BM - 10 mg bupivacaine with 2 mg of preservative-free midazolam.

demographic, clinical details, examination findings, laboratory investigations were noted in case record form. A detailed pre-anaesthetic evaluation was done for anaesthesia fitness. Fit patients were posted for elective caesarean section. patients were kept NBM for minimum 6 hours.

In operation theatre, baseline parameters such as pulse rate, blood pressure, respiratory rate and SpO2 were recorded. After preloading with 10 mL/kg Ringer lactated solution, under all aseptic precautions, through midline approach, spinal anaesthesia was given. As per group allocation drugs were given by spinal route.

Patients' hemodynamic parameters including maternal pulse rate, non-invasive blood pressure, oxygen saturation, and respiratory rate measured periodically & were recorded. Standard postoperative care was provided. The duration of effective analgesia was taken from the time of intrathecal drug administration to the time of first supplementation with rescue analgesic.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

Results

Baseline characteristics of pregnant women such as age, weight, height, ASA grade & duration of surgery (min) were comparable in both groups & difference was not statistically significant.

Table 1: Baseline Information & Vitals of Study Groups

Characteristics	group B (mean ± SD)	group BM (mean ± SD)	p value
Age (years)	23.92 ± 3.7	23.62 ± 4.1	0.63
Weight (kgs)	60.52 ± 9.5	61.01 ± 10.1	0.35
Height (cms)	158.7 ± 6.3	157.9 ± 7.1	0.52

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ASA grade			0.075
I	24	22	
II	6	8	
Duration of surgery (min)	54.6±12.24	55.96±17.93	0.35

Vitals of pregnant women such as pulse rate, systolic BP & diastolic BP were comparable in both groups & difference was not statistically significant.

Table 2: Vitals of Study Groups

Characteristics	group B (mean ± SD)	group BM (mean ± SD)	p value
Pulse Rate (per min)	84.5 ± 10.6	83.6 ± 9.3	0.59
Systolic BP (mm Hg)	119.4 ± 14.2	117.1 ± 13.9	0.12
Diastolic BP (mm Hg)	71.8 ± 9.9	72.4 ± 9.1	0.15

In present study early onset time of sensory block, reduced time to achieve complete sensory block & prolonged duration of effective analgesia was noted in group BM as compared to group B, and the difference was statistically significant.

Table 3: Duration of sensory and motor analgesia.

Variables	Control group Group BNS (n=30)	Midazolam group Group BM (n=30)	P value
Onset of sensory block (min)	6.03 ± 3.12	4.51 ± 2.8	0.018
Onset of motor block (min)	7.09 ± 3.73	5.91 ± 3.31	0.039
Time to regression of sensory block to s2 segment	132.8 ± 25.2	179.1 ± 26.8	0.041
Duration of motor block	151.83±10.96	179.67±14.94	0.021
Duration of effective analgesia	188.40±13.63	236.60±17.60	0.032

Complications such as bradycardia, hypotension, nausea and vomiting were noted in present study. Group B had slightly increased number of complications than group BM, difference was not statistically significant.

Table 4: Complications

Complications	group B (mean ± SD)	group BM (mean ± SD)	p value
Bradycardia	2	1	0.063
Hypotension	2	1	
Nausea and vomiting	1	1	

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Discussion

Postoperative pain after caesarean delivery is an unpleasant outcome for women and may result in delayed ambulation, prolonged time for discharge from hospital, poor bonding with the newborn, low satisfaction scores and delay breastfeeding.

Several additives (opioids, clonidine, neostigmine, ketamine, midazolam, etc.) used as an adjunct with intrathecal injection of local anesthetic solutions are aimed at improving the quality and duration of spinal block and postoperative analgesia, or to minimize the dose of a local anesthetic to reduce the extent and effects of sympathetic blockade.[6]

Midazolam is imidazobenzodiazepine which is water soluble in acid formulation but is highly lipid soluble in vivo. It has spinally mediated antinociceptive effect.[7] Intrathecal midazolam prolonged the duration of spinal anaesthesia when compared with placebo.[8]

Chattopadhyay A et al.,[9] noted that use of midazolam as adjuvant with the local anesthetic in spinal anaesthesia significantly increases the duration of analgesia (median 320 min versus 220 min) and motor block (median 255 min versus 195 min) but decreases the incidence of postoperative nausea-vomiting (PONV).[9]

Karbasfrushan A et al.,[10] compared BNS (bupivacaine plus normal saline) group, with BM (bupivacaine plus intrathecal midazolam) group for postoperative analgesia in LSCS patients. They reported a significant relief in pain (15 min and 120 min) after the surgery. There were no significant differences between the groups regarding the intensity of pain 5, 30, 60 and 240 min after the surgery. The average time until the first dose of additional analgesic, per mother's request was 142.18±55.19 min in the BNS vs 178.06±77.33 min in the BM group.

In the study by Sharma N et al.,[11] highest level of sensory blockade ($p<.05$), motor block duration (179.67±14.94 vs 151.83±10.96 min), sensory block duration (222±16.5 vs 174±12.53 min) and time to first requirement of i.v. analgesia were significantly higher in group BM. Postoperative VAS score was significantly less in group BM. Both groups were comparable in demographic data and hemodynamic changes.

In study by Prashant MP,[12] 60 patients were equally divided into Group A : (Inj. Bupivacaine 10 mg) & Group B : (Inj. Bupivacaine 10 mg + inj. Midazolam 1mg). The duration of anesthesia was more in Group B i.e. 88.66± 17.75 as compared to 86±16.15 but the difference was not statistically significant ($t=0.608, p>0.05$). The duration of analgesia was more in Group B i.e. 246±39 as compared to 200 ±21 but the difference was not statistically significant ($t=0.608, p>0.05$) .The doses required for analgesia was less in group A i.e. 2.93 ± 0.630 vs in Group B i.e. 2.96±0.490 but the difference was not statistically significant ($t=0.226, p>0.05$) .The most of the patients with VAS 2 or 3 were more in Group A as compared to Group B but the difference was not significant ($X2 =1.950, p>0.05$). The most of

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the patients with VAS 6,4, 3 or 2 were more in Group A as compared to Group B but the difference was not significant (X2 =2.70 ,p>0.05)

Sanwal MK et al.,[13] studied bupivacaine sparing effect of intrathecal midazolam in sub-arachnoid block for cesarean section & concluded that, 7.5 mg bupivacaine with 2 mg midazolam is the optimum dose ratio combination to be used in subarachnoid block for caesarean section. intrathecal midazolam 2 mg, it is possible to reduce the dose of bupivacaine from 2.2 mg to 1.5 mg to provide the same surgical anesthesia but with fewer incidence of hypotension and other side effects.

Opioids like morphine and fentanyl are extensively used to potentiate analgesic effect of local anesthetics in neuraxial blockade, but adverse effects like pruritus, urinary retention, postoperative vomiting and respiratory depression limit the use of opioids.[14] The subarachnoid midazolam is also devoid of complications such as bradycardia, hypotension, postoperative nausea and vomiting, pruritus, urinary retention, and neurotoxicity.

Intrathecal administration of drugs in combination results in prolonged and better analgesic effect as compare to individual drug administration. In combination drug usage, doses of drugs also reduce which gives another advantage in avoiding their dose-related adverse effects.

Conclusion

In present study, for caesarean section intrathecal bupivacaine plus midazolam had earlier onset of sensory block, prolonged postoperative analgesia with less complications. Anaesthetist should use intrathecal bupivacaine plus midazolam for caesarean section for better postoperative analgesia.

Conflict of Interest: None to declare
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