Original Article

Does 10mg versus 12.5mg of 0.5% hyperbaric bupivacaine influence the incidence of epigastric discomfort encountered during caesarean section under spinal anesthesia?

Rehana Feroze[1], Aftab Hussain[2], Faisal Waheed[3], Muhammad Tariq[4], Muhammad Asif Saleem[5], Abdul Wasay Toor[6]

[1,6] Assistant Professor Anaesthesiology, CMH Lahore Medical and Dental College, Lahore.
[2,5] Senior Registrar Anaesthesiology, CMH Lahore, Lahore.
[3] Associate Professor Anaesthesiology, Armed Forces Institute of Urology, Rawalpindi.
[4] Professor Anaesthesiology, CMH Lahore Medical and Dental College, Lahore.

Author's Contribution
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Corresponding Author
Dr. Rehana Feroze,
Assistant Professor Anaesthesiology,
CMH Lahore Medical and Dental College, Lahore
Email: rehanaferoze@gmail.com

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Abstract

Objective: To determine the effect of two different volumes of 0.5% hyperbaric bupivacaine in relation to epigastric discomfort during Cesarean section under spinal anaesthesia.

Study design: Randomized double-blind study.

Place and Duration of Study: Department of Anaesthesiology, Combined Military Hospital, Lahore over a period of twelve months from June 2020 to May 2021.

Materials and Methods: A total of 168 women presenting for elective Cesarean section were divided into two equal groups. In group A, 2 milliliters of hyperbaric 0.5% bupivacaine were given in intrathecal space while in group B, 2.5 milliliters of hyperbaric 0.5% bupivacaine were given after standard volume loading. The presence or absence of epigastric/visceral pain was observed. Mean arterial pressure was also recorded at 1, 5, 10, 20, and 40 minutes.

Results: Demographic data including age, body mass index, and American society of anesthesiology status was comparable in both groups. Hypotension was seen in 44 (52.38%) in group A whereas it was seen in 52 (61.9%) in group B. This difference was insignificant with a p-value of 0.212. In group A, 22 (26.19%) patients complained of epigastric discomfort, while in group B, 12 (14.29%) patients complained of epigastric discomfort. Though fewer patients in group B suffered epigastric discomfort but this difference was statistically insignificant with a p-value of 0.055.

Conclusion: It is concluded in our study that there is no statistically significant difference in pain encountered during caesarian section with a volume of 2 milliliters or 2.5 milliliters 0.5% bupivacaine given for spinal anesthesia.

Keywords: Epigastric discomfort, Hyperbaric bupivacaine, Maternal hypotension, Spinal induced hypotension, Visceral pain.

Introduction

Spinal anaesthesia is preferred by anaesthesiologist for women undergoing cesarean section (C-Section) because it avoids the need for intubation which might be difficult in obstetric patients and also due to the increased risk of aspiration. Moreover, it provides effective pain control and early return to routine activity.[1]

Despite adequate sensory and motor blockade, many women complain of dull pain in the epigastric region which may be accompanied by nausea, vomiting, or hypotension during C-section under spinal anaesthesia.[2] Multiple mechanisms are given in the literature to explain this pain.

Exteriorization of the uterus during repair may cause intense peritoneal traction resulting in visceral pain.[3] Although a spinal level of T10 is adequate for pain arising from the uterus; peritoneal nerve supply is up to T4. Thus requiring a much higher blockade to abolish visceral pain. However, achieving a spinal block up to T4 has a higher risk of hemodynamic changes.[4] Another possible explanation for chest pain is small air emboli entering circulation, coronary artery spasm or esophageal spasm, and large bolus doses of oxytocin injection.[5]

This study was carried out to establish a relationship between two different volumes of 0.5% bupivacaine and epigastric discomfort during C-section under spinal anaesthesia.

Materials and Methods

This randomized double-blind study was carried out in the Department of Anaesthesiology, Combined Military Hospital, Lahore from 1st June 2020 to 30th May 2021 after approval from Ethical Committee. Written informed consent was taken from all patients included in the study.

American society of anesthesiology (ASA) status II and III obstetric cases of age between 20 to 40 years undergoing elective C-section under spinal anesthesia were included in this study. Any high-risk pregnancy, mothers with known fetal anomalies, BMI > 40, and cases due to inadequate block were converted to general anesthesia were excluded from the study. Patients who required repeat bolus doses of oxytocin were also excluded from the study.

A sample size of 168 was calculated with 80% power of test and 5% margin of error, with visceral pain incidence of 71% and 50% in each group.[6] Patients were randomly divided into two groups; Group A and Group B on basis of the volume of 0.5% bupivacaine to be given.

Patients were preloaded with 1000 ml of Ringer's lactate solution. Baseline means arterial pressure was noted. Under strict aseptic measures, spinal anaesthesia was given with 2 ml of 0.5% hyperbaric bupivacaine to Group A patients and 2.5 ml of 0.5% hyperbaric bupivacaine to Group B patients using 27 G Quincke needle in sitting position. Patients were placed in a supine position immediately after spinal injection with leftward uterine displacement by placing a wedge under the right buttock. The effectiveness of the spinal was assessed by a modified Bromage scale before proceeding with surgery. Mean arterial pressure (MAP) was recorded at an interval of 1, 5, 10, 20, and 40 minutes after giving spinal anaesthesia.

Episodes of hypotension were managed with 5-10 mg of ephedrine given intravenously to keep systolic blood pressure greater than 100 mm Hg. Oxytocin 5 units diluted in 10 ml was given slowly after delivery of the baby followed by infusion at a rate of 10 ml/hr. The presence or absence of epigastric discomfort during the procedure was documented. In patients who complained of epigastric discomfort, rescue analgesia was given using nalbuphine 3 mg intravenously.

Data were analyzed using Statistical Package for Social Sciences analysis program (IBM-SPSS version 24). Mean and standard deviation was presented for quantitative variables like age, BMI, and duration of surgery. The frequency and percentage of qualitative variables like epigastric discomfort, ASA Class, and hypotension were computed. Independent-sample T-test was applied to compare the two groups with respect to the age and Body Mass Index (BMI) of the patients. The Chi-square test was used to compare the two groups with respect to epigastric discomfort and hypotension.

Results

The age range of the patients selected for this study was from 20 years to 40 years with a mean and standard deviation of 29.32±3.93. The mean age in group A was 29.43±3.72 while it was 29.2±4.14 years in group B. Difference in age between the two groups was insignificant with a p-value of 0.71. BMI for group A was 32.12 kg/m^2, whereas it was 31.08 kg/m^2 for group B. This difference was statistically insignificant with a p-value of 0.092.

A comparison of the ASA status of patients of both groups is shown in Table 1.

Table 1: Comparison of ASA status of patients of both groups

Group	*ASA II (n%)*	*ASA III (n%)*	*P-value*
A	79 (94.05%)	5 (5.95%)	0.469
B	81 (96.3%)	3 (3.7%)	

A comparison of hypotension seen in patients of both groups is shown in Table 2.

Table 2: Comparison of Hypotension seen in patients of both groups

Group	*Hypotension*		*P-value*
	Yes (n%)	**No (n%)**	
A	44 (52.38%)	40 (47.62%)	0.212
B	52 (61.9%)	32 (38.1%)	

A comparison of epigastric discomfort seen in patients of both groups is shown in Table 3.

Table 3: Comparison of epigastric discomfort seen in patients of both groups

Group	*Epigastric Discomfort*		*P-value*
	Yes (n%)	**No (n%)**	
A	22 (26.19%)	62 (73.81%)	0.055
B	12 (14.29%)	72 (85.71%)	

Discussion

Spinal anaesthesia for C-sections should aim to provide adequate surgical analgesia without affecting maternal hemodynamics and fetal outcomes. However, there is no consensus that what should be the ideal dose for spinal anaesthesia in obstetrics. Although the onset of adequate sensory block is directly related to the height of the patient and inversely related to the patient's weight; mostly a fixed dose regimen is used by anaesthetists in our practice.[7] Other factors affecting the level of the block are intervertebral site of injection, patient positioning during as well as after induction of spinal anaesthesia, intra-abdominal pressure and baricity of local anaesthetic.[8] Lateral position during spinal anaesthesia injection resulted in better hemodynamic stability as compared to the sitting position.[9]

Post-spinal hypotension occurs in three-quarters of women if adequate measures are not taken prophylactically.[10] A lower than conventional spinal anaesthetic dose decreases maternal hypotension risk however at the cost of slower onset and shorter duration of the block.[11] Moreover there is a risk of inadequate blockade and intraoperative pain which cause distress for the patient which may require conversion to general anaesthesia.

Despite the adequate level of sensory block, visceral pain during C-section is often experienced by the patient under spinal anaesthesia which is described as a deep, dull, and vague sense of discomfort in the epigastric region.[12] This may occur despite an adequate level of block.[13] Visceral pain may be arising from the uterus or from surrounding organs.[14] Our study has shown that there is no difference between 2 ml and 2.5 ml of 0.5% hyperbaric bupivacaine in terms of epigastric discomfort as well as hemodynamic instability. Literature reviews show varying results with respect to the volume of spinal bupivacaine and the incidence of visceral pain. In our setup, we routinely use a 2.5 ml dose. Though in our study lesser number of patients complained of epigastric pain with a 2.5 dose but the difference was statistically insignificant. There was also no difference in both doses in terms of hemodynamic instability. Therefore either dose can be safely used for c-section

In a study conducted by Hirabayashi Y. et al, three doses of spinal amethocaine were compared; higher doses of amethocaine (12-14 mg) significantly reduced the incidence of visceral pain during C-section.[15] However in a study done by Alahuhta S. et al, there was no relationship between cephalad level of analgesia and visceral pain under spinal and epidural anaesthesia with bupivacaine.[16] Addition of opioids not only decreased the dose required for an adequate block but also prevents visceral pain. A study done by Bogra et al. compared different doses of hyperbaric bupivacaine with and without fentanyl. Results showed no visceral pain with increasing the dose of bupivacaine to 12.5 mg. However similar results were observed with 8 mg of bupivacaine with 12.5 mcg of fentanyl providing better hemodynamic stability.[17] Oxytocin bolus is another mechanism explained for epigastric discomfort during C-section. Giving 5 IU (International Units) of oxytocin infusion over 5 min is associated with a lower risk of epigastric discomfort as compared to giving 5 IU over 5 seconds.[18,19] Further local studies should be carried out to see the impact of adding spinal opioids in reducing visceral pain.

There are a few limitations in our study. The exact intervertebral site of spinal anaesthesia was not fixed. Inserting spinal anaesthesia at L 2 – L 3 / L 3 – L 4 / L 4 – L 5 can impact the onset of block, density of block, and hemodynamic stability.[20] Adequacy of block in

our study was assessed by a modified Bromage scale and giving painful stimulus at the incision line (T12/L1) without obtaining the exact level of sensory block. This can impact the result where visceral pain might be due to inadequate sensor level.

Conclusion

It is concluded in our study that there is no statistically significant difference in pain encountered during caesarian section with a volume of 2 ml or 2.5 ml 0.5% bupivacaine given for spinal anesthesia.

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