



TO STUDY THE HEMODYNAMIC STABILITY BETWEEN 0.5% HYPERBARIC LEVOBUPIVACAINE AND 0.5% HYPERBARIC BUPIVACAINE FOR SPINAL ANESTHESIA IN CESAREAN SECTION.

Anesthesiology

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ABSTRACT

Background: Spinal anesthesia is most commonly used for both elective and emergency cesarean section. The aim of this study was to compare the hemodynamic effects of intrathecal 0.5% hyperbaric levobupivacaine with 0.5% hyperbaric bupivacaine in spinal anaesthesia for lower segment caesarean section.

Materials and Methods After Institutional Ethical Committee approval, 60 patients of American Society of Anesthesiologists I-II and age between 18-40 years after obtaining written informed consent to receive spinal anesthesia for cesarean section were randomized into two groups: Group B (0.5% hyperbaric bupivacaine 10 mg in L₃₋₄ intrathecal space), and Group L (0.5% hyperbaric levobupivacaine 10 mg in L₃₋₄ intrathecal space). The hemodynamic changes including heart rate, systolic blood pressure, diastolic blood pressure and mean blood pressure were recorded for every 1 min for 3 consecutive min, then every 5 min to 15 min, and then every 15 min interval throughout the surgery. Hypotension (systolic blood pressure <100 mmHg or fall >20% from baseline) was managed with injection mephentermine 3 mg IV in incremental doses. Bradycardia is defined as HR<50/min and treated with atropine 0.6 mg IV. Statistical analysis was performed using the SPSS version 20 software windows. A P < 0.05 was considered significant.

Results The sensory block levels required for cesarean section were achieved in both groups and it was observed that heart rate, SBP, DBP and MAP were more stable in Group L and the requirement for Injection mephentermine was more in Group B.

Conclusion: Hyperbaric Levobupivacaine 10 mg used in lower segment cesarean section provided more stable hemodynamics as compared to 10mg hyperbaric bupivacaine when given in L₃₋₄ space.

KEYWORDS

Spinal Anesthesia; Levobupivacaine; Bupivacaine; Cesarean Section

INTRODUCTION

Spinal anaesthesia was pioneered in humans by a German surgeon Dr August Bier on August 15th 1898 using Quinke method of entering the intrathecal space. The technique has been refined since then and has evolved into the modern concept of spinal anaesthesia.

Hyperbaric bupivacaine 0.5%, an amide local anaesthetic is presently the most common drug used for obstetric anesthesia. Hyperbaric bupivacaine in 8% glucose is often used. Bupivacaine is hyperbaric in comparison with human CSF.^[1] Following the reports of cardiovascular toxic effects^[2] of bupivacaine by Albrights in 1979, relative pharmacological behaviors of both R(+) and S(-) enantiomers of bupivacaine were studied intensively and the S(-) enantiomer (levo-enantiomer) appeared to have a safer pharmacological profile^[3] Levobupivacaine, a pure S(-) bupivacaine enantiomer, was approved by the United States Food and Drug Administration in 1997. While some studies^[4] have found the clinical effect of bupivacaine and levobupivacaine indistinguishable, others^[5] have found levobupivacaine to cause fewer side effects such as hypotension, bradycardia, and nausea. Levo-bupivacaine use in clinical practice is due to its reduced toxic effects on the heart and central nervous system, as compared to bupivacaine.

This study was planned in two groups of parturients to compare the hemodynamic effects of bupivacaine and levobupivacaine given in L₃₋₄ intrathecal space. Hemodynamic effects were assessed at various time intervals following spinal anesthesia.

MATERIAL AND METHODS

The randomized, clinical trial was conducted in the Department of Anaesthesiology, SMGS hospital jammu, in 60 parturients (American Society of Anesthesiologists [ASA] I-II, age 18-40 years, heights 135-165 cm) scheduled for cesarean section. Following Institutional Ethics Committee approval and after obtaining written informed consent, the parturients were assigned into two groups (n = 30). Group B and Group L received 10 mg of 0.5% hyperbaric bupivacaine and levobupivacaine in L₃₋₄ intrathecal space. Patient refusing regional anesthesia or known contraindication to spinal anesthesia (sepsis, local infection, coagulopathy, spine deformity or space occupying lesion in the brain, maternal hypotension, and hypervolemia) were excluded from the study. Randomization was done by a computer-generated table of random numbers. For blinding, the drugs were prepared by another anesthesiologist not directly involved in the study. Commercially available hyperbaric bupivacaine contain 8% glucose. Levobupivacaine is available as isobaric 0.5% solution. We made it

hyperbaric solution^[6] by adding glucose to 2 ml of isobaric levobupivacaine. The specific gravity of cerebrospinal fluid is 0.007. With addition of 8% glucose, specific gravity becomes 1.02487 for bupivacaine and levobupivacaine at 37°C.^[7]

Preanesthetic evaluation was done a day before the scheduled operation for all the parturients. They were asked to take tablet ranitidine 150 mg orally at bedtime. On the day of operation, patients were shifted to the preanesthetic room. A suitable peripheral vein was cannulated with 18-20 G cannula. Injection metoclopramide 10 mg intravenous (iv) and injection ranitidine 50 mg iv were given 1 h prior to shifting to operation theater (OT). Preloading was done with 10 ml/kg of balanced salt solution within 30 min of spinal anesthesia. At OT baseline, hemodynamics parameters such as noninvasive blood pressure, electrocardiogram, O₂ saturation (SPO₂), and heart rate were recorded in the supine position. Then, the patient was put in the left lateral position. Under aseptic and antiseptic precaution, intrathecal injection was given in L₃₋₄ space. Time of intrathecal injection was taken as 0 min. Immediately after giving the subarachnoid block, the patient was kept in the horizontal supine position. A wedge was put under the right buttock to avoid aortocaval compression. Then, hemodynamic parameters were recorded for every 1 min for 3 consecutive min, then every 5 min up to 15 min, and then every 15 min interval throughout the surgery period intraoperatively. Hypotension (fall in blood pressure [BP] >20% from the baseline or systolic BP <100 mmHg) was treated with injection mephentermine 3 mg iv increments (s). Bradycardia is defined as HR<50/min and treated with atropine 0.6 mg.

Postoperative hemodynamic changes were recorded for the parturient in the postoperative care unit every 10 min till the patients were stabilized and ready to transfer to respective wards.

Statistical analysis was performed by IBM SPSS for Windows version 20 (Armonk, New York, USA). Two group mean compared by independent sample test (t-test) and more than two group mean by ANOVA (F-test). χ^2 -test is applied for categorical variables and the P<0.05 are considered as significant.

RESULTS

All the patients happen to be female of ASA I. There has been no statistical difference between groups in terms of their demographic characteristics (Table-1). Equal level of anaesthesia and analgesia was seen in both groups. levobupivacaine seems to provide more hemodynamic stability than bupivacaine. Hypotension and

bradycardia were more common in the B group ($p < 0.05$). It was observed that the requirement of intraoperative mephenteramine was higher in Group B, as incidence of hypotension was more in group B.

TABLE 1

	GROUP L	GROUP B
Age (years)	23.77 ± 4.01	24.04 ± 11.08
Height (cm)	160.33 ± 4.04	161.00 ± 2.80
Weight (Kg)	60.17 ± 4.01	60.61 ± 2.98

TABLE 2

Parameters	Group I	%	Group B	%
Hypotension	3	10	10	33.3
Bradycardia	1	3.33	8	26.66

Nausea and vomiting were noticed more frequently in the Group B though statistically insignificant ($p > 0.05$). Other side effects such as headache, backache and itching were similar in both the groups.

DISCUSSION

This study was undertaken to compare the hemodynamic effects of intrathecal levobupivacaine and bupivacaine when given in L₃₋₄ intrathecal space for lower segment cesarean section (LSCS). Sixty parturient were divided into two equal ($n = 30$) groups.

In our study, sensory block levels required for cesarean section were achieved in both groups, and it was observed that the hemodynamic stability with levobupivacaine was better maintained.

In our study we observed that hypotension occurred in both the groups but more fall in blood pressure was observed in bupivacaine group ($p < 0.05$) with more need for inj mephenteramine which was statistically significant. Gulen Guler et al^[8] in their study showed similar results in which 5 out of 30 in group Levobupivacaine and 11 out of 30 in group Bupivacaine showed hypotension, which was significant ($p < 0.05$). Also Herrera R et al^[9] in their study of haemodynamic effect on patients aged 65 yrs for sub arachnoid anaesthesia observed similar results with the incidence of hypotension was statistically significantly higher ($p < 0.05$) in group Bupivacaine (38.3%) compared to group Levobupivacaine (13.3%). The results of our study were also similar to Ayesha Goyal et al^[10] where they observed hypotension more in patients who received 0.5 % bupivacaine. But in a study conducted by Thepakorn Sathitkarnmanee et al^[11] observed hypotension in 5 out of 35 in Levobupivacaine group, and 1 out of 35 in Bupivacaine, though the results were not significant this might be due to difference in doses and space in which the block was given. Also study conducted by Feroz A Dar et al^[12] did not found any significant differences in both the groups when hypotension was compared.

In our study we observed changes in heart rate in bupivacaine group. 8 of 30 patients in bupivacaine group had bradycardia and were treated with inj atropine while only 1 patient in levobupivacaine group had bradycardia ($p < 0.05$). 9 out of 30 patients in bupivacaine group and 2 out of 30 patients in levobupivacaine group had bradycardia in the study of Gulen Guler et al^[8], which was statistically significant ($p < 0.05$). F Fattorini et al^[13] in study of spinal anaesthesia for orthopaedic surgery did not find any significant changes in heart rate. Herrera R et al^[9] found that heart rate (HR) decreased at 30 minutes after anaesthesia onset (5% in group BUPI versus 9% in group L).

Incidence of side effects like nausea, vomiting, itching, was more in bupivacaine group though all got treated with no sequelae whereas the incidence of headache and backache was similar in both groups.

CONCLUSION:

Hyperbaric Levobupivacaine 10 mg used in lower segment cesarean section provided more stable hemodynamics as compared to 10mg hyperbaric bupivacaine when given in L₃₋₄ space.

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