



ORIGINAL RESEARCH PAPER

Anaesthesiology

A COMPARATIVE STUDY BETWEEN SITTING POSITION VERSUS LEFT LATERAL POSITION IN SUBARACHNOID BLOCK DURING ELECTIVE CESAREAN SECTION USING HYPERBARIC LEVOBUPIVACAINE

KEY WORDS: cesarean section; spinal anesthesia; subarachnoid block; levobupivacaine; sitting position; left lateral position; maternal hypotension; obstetric anesthesia.

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ABSTRACT

Background: Patient position during subarachnoid block (SAB) influences technical ease, intrathecal spread of hyperbaric local anesthetic, maternal hemodynamics, and overall quality of spinal anesthesia during cesarean delivery. Evidence comparing sitting and left lateral positions specifically with hyperbaric levobupivacaine remains limited. **Methods:** A prospective randomized comparative clinical study was conducted in 90 ASA I-II term parturients scheduled for elective lower segment cesarean section under spinal anesthesia. Participants were randomized into sitting position (Group S, n=45) and left lateral position (Group L, n=45) for SAB with 2.0 mL (10 mg) of 0.5% hyperbaric levobupivacaine at L3-L4 using a 25G Quincke needle. Sensory and motor block characteristics, technical ease, maternal hemodynamics, vasopressor/atropine requirement, maternal satisfaction, postoperative complications, and neonatal outcomes were compared. **Results:** Baseline demographic and obstetric variables were comparable between groups. SAB was technically easier and quicker in the sitting group, with more first-attempt success and less positioning difficulty. The left lateral group demonstrated faster onset of sensory and motor block and achieved peak sensory level earlier. However, the sitting group showed greater early hemodynamic instability, with a larger fall in mean arterial pressure, higher incidence of hypotension, and greater vasopressor requirement. Bradycardia, atropine requirement, sensory block duration, motor block duration, postoperative complications, Apgar scores, and NICU admission rates were comparable. Maternal comfort and satisfaction were significantly better in the lateral group. **Conclusion:** Both sitting and left lateral positions are safe and effective for SAB with hyperbaric levobupivacaine in elective cesarean section. The sitting position offers easier and faster block administration, whereas the left lateral position provides better maternal comfort, faster block onset, and superior hemodynamic stability. Position selection should therefore be individualized according to clinical priorities and operator expertise.

INTRODUCTION

Cesarean section is one of the most frequently performed major obstetric operations worldwide, and neuraxial anesthesia remains the preferred anesthetic technique for elective procedures because it avoids airway manipulation, minimizes fetal drug exposure, and allows the mother to remain awake during delivery.

Single-shot spinal anesthesia provides rapid, dense sensory and motor blockade suitable for lower segment cesarean section (LSCS). However, maternal hypotension, bradycardia, nausea, and variable spread of local anesthetic continue to be important concerns in obstetric anesthesia.

Patient position during intrathecal injection is a modifiable factor that can influence ease of SAB, cephalad spread of hyperbaric solution, onset and extent of sensory and motor block, and maternal hemodynamic response. The sitting position generally facilitates landmark identification and technical ease, whereas the left lateral position may reduce aortocaval compression and improve hemodynamic stability. Levobupivacaine, the S(-)-enantiomer of bupivacaine, has emerged as an attractive alternative to racemic bupivacaine because of its lower cardiotoxicity and neurotoxicity with comparable anesthetic efficacy. Data directly comparing sitting versus left lateral position specifically with hyperbaric levobupivacaine in elective cesarean section are limited. The present study was therefore undertaken to compare the two positions with respect to block characteristics, maternal hemodynamics, technical ease, maternal satisfaction, and neonatal outcomes.

AIMS AND OBJECTIVES

Aim

To evaluate and compare the effectiveness of sitting versus left lateral position for subarachnoid block using hyperbaric levobupivacaine in elective cesarean section.

Objectives

1. To compare sensory and motor block characteristics between sitting and left lateral positions.
2. To compare maternal hemodynamic stability, including hypotension and bradycardia.
3. To assess technical ease and success of spinal anesthesia in both positions.
4. To compare maternal comfort and satisfaction.
5. To compare neonatal outcomes using Apgar scores and NICU admission.

MATERIALS AND METHODS

Study Design and Setting: This prospective randomized comparative clinical study was conducted in the Department of Anaesthesiology, Index Medical College Hospital and Research Centre, Indore, after approval from the Institutional Ethics Committee and written informed consent from all participants.

Study Population: Ninety term parturients aged 18–40 years, ASA physical status I–II, scheduled for elective LSCS under spinal anesthesia were enrolled. Patients with refusal, contraindication to regional anesthesia, hypersensitivity to local anesthetics, severe systemic illness, spinal deformity/surgery, multiple gestation, polyhydramnios, or intrauterine growth restriction were excluded.

Randomization and Groups: Participants were randomized into two equal groups of 45 each. Group S received SAB in the sitting position and Group L received SAB in the left lateral decubitus position.

Anesthetic Technique: After standard monitoring and preloading with Ringer's lactate, SAB was performed at the L3–L4 interspace using a 25G Quincke needle under strict asepsis. After free flow of CSF was confirmed, 2.0 mL (10 mg) of 0.5% hyperbaric levobupivacaine was injected

intrathecally over 10 seconds without barbotage. Patients were then positioned supine with left uterine displacement using a wedge under the right hip.

Outcome Measures: Sensory block onset, time to peak sensory level, two-dermatome regression, onset and duration of motor block (modified Bromage scale), number of attempts, time required for SAB, maternal hemodynamic variables, vasopressor and atropine requirement, maternal satisfaction, postoperative adverse effects, Apgar scores at 1 and 5 minutes, and NICU admission were recorded.

Definitions and Management: Hypotension was defined as systolic blood pressure <90 mmHg or a fall >20% from baseline and treated with intravenous fluids and mephentermine 6 mg boluses. Bradycardia was defined as heart rate <50/min and treated with atropine 0.6 mg IV.

Statistical Analysis: Data were analyzed using SPSS. Continuous variables were expressed as mean ± standard deviation and categorical variables as frequency and percentage. A p value <0.05 was considered statistically significant.

RESULTS

Ninety parturients were studied, with 45 patients in each group. Baseline age, weight, height, gestational age, and ASA physical status were comparable between the sitting and left lateral groups.

SAB was technically easier in the sitting group. Mean time required for SAB was significantly shorter in Group S (2.8 ± 0.8 min) than in Group L (3.3 ± 0.9 min; p=0.006). First-attempt success was also higher in the sitting group (82.2% vs 66.7%). Positioning before SAB was rated easy in 75.6% of Group S compared with 48.9% of Group L (p=0.027).

The left lateral group showed faster block onset. Sensory block to T10 occurred earlier in Group L (2.4 ± 0.6 min) than in Group S (3.0 ± 0.7 min; p<0.001), and time to highest sensory level was also shorter in Group L (6.8 ± 1.4 vs 7.6 ± 1.6 min; p=0.013). Full motor block developed earlier in the lateral group as well.

Hemodynamic stability favored the left lateral group. The sitting group had a more pronounced fall in mean arterial pressure during the early intraoperative period, a higher incidence of hypotension, and greater vasopressor requirement. Bradycardia was uncommon and comparable between groups (8.9% in Group S vs 13.3% in Group L; p=0.490), and atropine requirement was similar (p=0.526).

Maternal satisfaction was significantly higher in the left lateral group, with high satisfaction reported by 35.6% of Group L compared with 24.4% of Group S (p=0.041). Postoperative nausea/vomiting and shivering were slightly more frequent in the sitting group but the differences were not statistically significant. Post-dural puncture headache occurred more often in the sitting group.

Neonatal outcomes were similar in both groups. Mean Apgar scores at 1 minute (8.3 ± 0.6 in Group S vs 8.2 ± 0.6 in Group L; p=0.432) and 5 minutes (9.5 ± 0.5 in both groups; p=1.000) were comparable. NICU admission rates were low and not significantly different (2.2% in Group S vs 4.4% in Group L; p=0.556).

Parameter	Sitting (Group S)	Left lateral (Group L)
Sample size	45	45
Time for SAB (min)	2.8 ± 0.8	3.3 ± 0.9
First-attempt success	82.2%	66.7%
Easy positioning before SAB	75.6%	48.9%

Onset of sensory block to T10 (min)	3.0 ± 0.7	2.4 ± 0.6
Time to highest sensory level (min)	7.6 ± 1.6	6.8 ± 1.4
Bradycardia	8.9%	13.3%
High maternal satisfaction	24.4%	35.6%
Apgar score at 1 min	8.3 ± 0.6	8.2 ± 0.6
Apgar score at 5 min	9.5 ± 0.5	9.5 ± 0.5
NICU admission	2.2%	4.4%

DISCUSSION

The present study demonstrates that both sitting and left lateral positions can be used successfully for SAB with hyperbaric levobupivacaine in elective cesarean section, but each position offers distinct advantages.

The sitting position was technically easier, required less time for SAB, and had a higher first-attempt success rate. This is consistent with the common practical experience that lumbar interspinous spaces are easier to identify in the sitting posture, particularly in pregnant patients with challenging landmarks.

By contrast, the left lateral position produced faster sensory and motor block onset and was associated with better maternal comfort and improved hemodynamic stability. Reduced aortocaval compression and better venous return in the lateral posture likely contributed to the lower incidence of hypotension and reduced vasopressor requirement.

Our findings are broadly in agreement with recent comparative studies reporting faster block onset and better hemodynamic profile in the lateral position, while sitting remains simpler and faster for block administration. Importantly, neonatal outcomes were similar in both groups, suggesting that either position is acceptable when maternal hemodynamics are appropriately managed.

The higher frequency of post-dural puncture headache in the sitting group and the greater satisfaction in the lateral group further support the clinical value of lateral positioning in patients where comfort and hemodynamic stability are prioritized. However, the technical simplicity of sitting may still make it preferable in patients with difficult anatomy or when rapid SAB placement is required.

CONCLUSION

Subarachnoid block with 0.5% hyperbaric levobupivacaine is safe and effective in both sitting and left lateral positions for elective cesarean section. The sitting position facilitates faster and technically easier SAB, whereas the left lateral position provides faster block onset, better maternal comfort, and superior hemodynamic stability with lower hypotension and vasopressor requirement. Both positions yield comparable neonatal outcomes. Therefore, position selection should be individualized according to patient characteristics, anesthesiologist experience, and the relative importance of technical ease versus maternal hemodynamic stability.

LIMITATIONS

1. Single-center study with a relatively modest sample size.
2. Blinding of the anesthesiologist to patient position was not feasible.
3. Long-term neurological follow-up was not performed.
4. Cord blood gas analysis was not included; neonatal assessment relied mainly on Apgar scores and NICU admission.

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