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## Comparison of the hemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section using hyperbaric bupivacaine

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### Abstract

**Background:** Central neuraxial blocks result in sympathetic block, sensory analgesia, and motor blockade. Hypotension is the most common undesirable consequence after spinal anaesthesia in participants. Maternal position and density of bupivacaine during induction of spinal anaesthesia are two most important factors which determine the speed of onset of sensory block and subsequently the hemodynamic outcomes. This study is to compare the Hemodynamic effects of lateral and sitting Positions during induction of spinal anaesthesia for caesarean section using hyperbaric bupivacaine.

**Materials and Methods:** A Prospective, Randomised, interventional study was conducted over 100 ASA grade 1, 2 and 3 and aged 25 to 35 years patients posted for caesarean section under spinal anaesthesia for the year 2022. Patients were randomly distributed in two groups prior to induction: Group S, sitting position and Group L, lateral position, after induction both the groups' patients were returned to supine position. All observation were recorded and Chi-square test was used to analyze categorical data. P value <0.05 interpreted as statistically significant.

**Results:** Heart rate, SBP, DBP, MAP and oxygen saturation were comparable in both the groups. The frequency of hypotension after spinal anaesthesia was less in parturient in lateral position during spinal anaesthesia, than in sitting position during spinal anaesthesia.

**Conclusions:** Keeping the parturient in lateral position during spinal anaesthesia, compared to sitting position, could decrease the frequency of hypotension after spinal anaesthesia.

**Keywords:** Lateral position, spinal anaesthesia, hemodynamic changes, maternal position

### Introduction

Spinal anaesthesia is routinely preferred mode of induction for caesarean section as higher maternal morbidity and mortality rate is associated with General anaesthesia. Hypotension is the most common undesirable consequence after spinal anaesthesia in parturients. Episodes of hypotension can trigger fetal and maternal distress and can be detrimental to both, if persistent.

In pregnant women, greater sensitivity to local anesthetics results in higher blocks, the effects of aortocaval compression, Cephalad spread of local anesthetic in the cerebrospinal fluid are influenced by the parturients' position during and just after the administration of spinal anaesthesia. Hypotension occurs with greater frequency and severity.

Lateral and sitting positions are commonly used for performing subarachnoid block in parturients. Choosing proper position during induction of anaesthesia is necessary for parturients and anaesthetist to prevent potential incomplete anaesthesia.

The study designed to compare the hemodynamic effects in parturients who were given spinal anaesthesia in lateral and sitting positions during cesarean section.

### Materials and Methods

A Prospective, Randomised, interventional study was conducted over 100 ASA grade 1, 2 and 3 and aged 25 to 35 years patients posted for caesarean section under spinal anaesthesia for the year 2022.

All the patients who met the inclusion criterias for study was taken informed consent. They were distributed in S (sitting) and L (lateral) group, 50 patients in each group. Patients

assigned to Group-S were administered spinal anesthesia by using 23-gauge Quincke’s needle at the level of L3, L4 space in sitting position using 2ml of hyperbaric Bupivacaine 0.5% and returned to supine position. Patients assigned to group-L were administered spinal anesthesia by using 23 gauge Quincke’s needle at the level of L3, L4 space in left lateral position using 2ml of hyperbaric Bupivacaine 0.5% and returned to supine position. Onset of the anesthesia was confirmed one minute after the spinal injection by asking the patient to subjectively verify the numbness of legs. Maternal vitals, including Heart rate and Blood Pressure were measured before induction and every 3 min afterwards for 10 min and later it was measured at every 15 minutes interval till effect of spinal anesthesia weans off.

**Results**

**Table 1:** Demographic characteristics of patients in both groups

Age	Group S	Group S	p value
Mean ± SD (years)	25.46 ± 3.65	26.6 ± 4.92	0.19
Weight			
Mean ± SD (kg)	60.08 ± 6.88	59.4 ± 6.35	0.6

Above table shows the demographic characteristics of patients in both the groups. Mean age of the patients was 25.46 ± 3.65 and 26.6 ± 4.92 years in S and L group respectively. Mean weight of the patients was 60.08 ± 6.88 and 59.4 ± 6.35 kg in S and L group respectively.

**Table 2:** Level of highest sensory block in both groups

Level of highest sensory block	Group S (%)	Group L (%)	p value
T4	29 (47.54)	32 (52.45)	0.53
T5	21 (53.84)	18 (46.15)	

Above table shows the level of highest sensory block in both the groups. Proportion of patients with T4 block was higher in group L (52.45%) compared to group S (47.54%) while 53.84% and 46.15% patients in group S and L respectively had sensory block level up to T5. This difference was statistically not significant.

**Table 3:** Association between spinal anesthesia position and hypotension

	Hypotension		p-value= 0.02
	Detected (%)	Not detected (%)	
Group S	26 (52)	24 (48)	
Group L	15 (30)	35 (70)	

Above table shows that in group S 52% patients developed hypotension while in group L only 30% patients developed hypotension. This difference was statistically significant.

**Table 4:** Association between spinal anesthesia position and bradycardia

	Bradycardia		p-value= 0.21
	Detected (%)	Not detected (%)	
Group S	13 (26)	37 (74)	
Group L	8 (16)	42 (84)	

Table presented above shows that in group S, 26% developed bradycardia while in group L only 16%

developed bradycardia. This difference between spinal anesthesia position and incidence of bradycardia was statistically not significant.

**Discussion**

Spinal anaesthesia is routinely the modality of choice for caesarean section as higher maternal morbidity and mortality rate is associated with General anaesthesia. The advantages of this technique include avoidance of airway complications and depressant agents, as well as the mother’s ability to remain awake and enjoy the birthing experience. This technique is simple and fast to apply and is regarded a reliable and cost-effective option, particularly compared to epidural anaesthesia. Hypotension following spinal anaesthesia is more common in pregnant women. Many different methods, including administration of fluids, vasopressors, and ondansetron, lower leg compression, and uterine displacement by wedge, have been used to decrease the risk of hypotension after the administration of spinal anaesthesia. Although the incidence of hypotension is diminished by these strategies, it continues to be a challenging adverse effect of spinal anaesthesia. Some trials have suggested that the patient’s position (sitting or lying) during or after spinal anaesthesia may affect the incidence of hypotension. So, in our study we compared sitting with lateral induction position to decrease the burden of hypotension and its related adverse effects. 100 ASA physical status I, II and III patients undergoing elective caesarean section were randomized to receive spinal anesthesia in the lateral position (N=50) or the sitting position (N=50).

Group S - Fifty parturient received spinal analgesia consisting of 2 ml of 0.5% hyperbaric bupivacaine in the sitting position

Group L - Fifty parturient received spinal analgesia consisting of 2 ml of 0.5% hyperbaric bupivacaine in the lateral position

In our study mean age of the patients was 25.46 ± 3.65 and 26.6 ± 4.92 years in S and L group respectively. Mean weight of the patients was 60.08 ± 6.88 and 59.4 ± 6.35 kg in S and L group respectively (Table-1). In a study by Muhammad Ali *et al.* [22]. Mean age of the patients was 29.18 ± 2.80 and 29.12 ± 2.52 years in S and L group respectively. In Manouchehrian N *et al.* [18]. Study the mean ages of women in spinal anesthesia in the sitting and lateral positions were 31.00 ± 5.013 and 30.28 ± 6.86, respectively. While in a study by Hajian P *et al.* [12]. mean age of women was 28.6 ± 5.5, 28.7 ± 5.1 and 29.5 ± 05 year in group S1, S2 and T respectively (Group S1, S2 - the subjects remained in a sitting position for 1 and 2 minutes, respectively after the induction of spinal anesthesia, Group T - subjects were immediately placed in a lying position). Mean weight of the women was 75.75 ± 7.85, 82.91 ± 1.4 and 77.17 ± 6.62 kg in group S1, S2 and T respectively. In K. Shahzad *et al.* [30]. Study mean weight of the women was 69.02 ± 9.63 and 67.97 ± 10.33 kg in sitting and lateral position group respectively.

The maximum sensory block in group S reaches T4 in 47.54% and T5 in 53.84% cases while in group L maximum sensory block in group L reaches T4 in 52.45% and T5 in 46.15% cases in our study (Table-3). In Mohamed Shamloul *et al.* [21]. Study the maximal sensory block in group 1 (sitting position) reaches T4 in 60% cases and T5 in 40% cases while in group 2 (left lateral position) the maximal

sensory block reached T4 in 63.3% cases and T5 in 36.7% cases. K. Shahzad *et al* [30]. Found that in the sitting group, 3 (8.6%) patients had highest sensory block up to T4 level, while in the lateral group, 2 (5.7%) achieved sensory block up to T5 level. In present study mean time to reach T6 sensory block was significantly longer in group S ( $4.16 \pm 1.13$  minute) compared to group L ( $2.98 \pm 0.89$  minute) (Table 57 4). Similar result observed by Mohamed Shamlool *et al* [21]. In their study, Patients of left lateral position group reached T6 sensory block faster than patients of sitting position group. A. tyagi *et al* [11] in their study reported that significantly higher S max (Maximal sensory block level) and faster time max (Period when S max was first achieved) were seen in group lateral as compared to group sitting.

In present study significant proportion of the patients (52%) in group S developed hypotension while in group L only 30% developed hypotension (Table-6). Similar result found in other studies also. Muhammad Ali *et al* [22]. Found that 52.3% and 30.7% patients developed hypotension in group S and L respectively. Manouchehrian N *et al* [18]. Found that in minutes 6 and 8 after spinal anesthesia, the frequency of hypotension in patients under the caesarean section with spinal anesthesia in the sitting position was significantly higher than that in patients in the lateral position ( $P < 0.05$ ) while Mohamed Shamlool *et al* [21]. Found that 30% and 40% patients developed hypotension in Sitting and Lateral position group respectively. K. Shahzad *et al* [30]. Reported. In the sitting group, 17% patients and in the lateral, 11% had hypotensive episode. Our study found that in group S, 26% developed bradycardia while in group L only 16% developed bradycardia (Table-7). In Mohamed Shamlool *et al* [21]. Study 20% and 16.7% patient developed bradycardia in sitting and lateral position 58 group respectively. In accordance with the present study, Ortiz *et al* [24], Chevuri *et al* [3], Prakash *et al* [22]. And Inglis *et al* [14]. Found that there was no significant difference between the studied groups regarding the heart rate.

### Conclusion

The present study revealed that the patient's position during the administration of spinal anaesthesia for caesarean section is an important factor, which affects the frequency of hypotension. Based on the findings, keeping the parturient in lateral position during spinal anaesthesia, compared to sitting position, could decrease the frequency of hypotension after spinal anaesthesia.

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