

Comparison of Hemodynamic Effects and Patient Satisfaction Between Lateral Versus Sitting Maternal Positions for Cesarean Deliveries in Spinal Anesthesia

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ABSTRACT

Objective: To compare the hemodynamic effects of spinal anesthesia in sitting vs. lateral maternal positions in terms of patient comfort and anesthetist convenience.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesia, Combined Military Hospital, Lahore Pakistan, from Jun 2018 to Dec 2018.

Methodology: Two hundred and sixteen patients admitted for Cesarean deliveries were randomly selected and divided into two groups of 108 each for spinal anesthesia in sitting (S-Group) or lateral (L-Group) positions. Baseline heart rate and blood pressure were recorded and readings for both were measured after every two minutes for 15 minutes. Hypotension and bradycardia were noted and treated. Patients were interviewed afterwards for comfort in sitting or lateral position and the number of spinal anesthesia attempts made were also recorded.

Results: In L-Group, 36(33%) patients had hypotension while 60(55.5%) had hypotension in S-Group. In L-Group, 4(3.7%) patients and 8(7.4%) patients in S-Group had bradycardia. Six patients (5.5%) in the Lateral-Group and 13(12%) in Sitting-Group required therapy for which the p-value came out to be significant. In Lateral-Group, 98 patients (90.7%) were comfortable and 9(8.3%) were uncomfortable, 1(0.97%) was agitated whereas in Sitting-Group 78(72%) were comfortable, 25(23%) were uncomfortable and 5(5%) were agitated. Subarachnoid puncture was 87% successful in S-Group and 74% successful in L-Group in 1st attempt.

Conclusion: Lateral spinal position was more comfortable with better hemodynamics however sub arachnoid puncture was easier in sitting position.

Keywords: Anesthesia, Cesarean Section, Hemodynamics, Spinal.

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INTRODUCTION

Regional anesthesia (spinal) is now the commonest technique for obstetric surgery all over the world because it offers many advantages over general anesthesia¹. Hypotension is a common side effect of spinal anesthesia, and it occurs in 16–33% of cases and is associated with potentially serious complications such as severe hypotension and bradycardia². Patient position has variable effects on the incidence of hypotension after spinal anesthesia³. Spinal anesthesia technique reached its peak in obstetrics in the world during 1960s⁴ and over the past two decades, use of regional anesthesia in obstetrics has increased dramatically in Pakistan following the trend in advanced world. However, popularity of spinal anesthesia in obstetrics has been waning internationally⁵. Two main reasons seem to be frequent spinal headache and

worsening of hypotension⁶. Spinal anesthesia can be initiated in either sitting or lateral position with traditional sitting positions used most frequently in local practice, however, modified sitting position (Hamstring Stretch) is gaining more acceptance, as it opens up intervertebral spaces better by decreasing lumbar lordosis, and makes identification of midline easier⁷. In spite of increasing use of subarachnoid block for caesarian deliveries, maternal position for the procedure is not standardized⁸. In current practice, the choice of a particular position for initiating spinal anesthesia is at the discretion of the anesthesiologist⁹. Sitting position seems to be optimal as identification of landmarks, particularly midline is much easier, however maintaining sitting position for laboring patients who are pre medicated becomes difficult¹⁰. Consequently, this study aimed to critically compare hemodynamic effects of sitting versus lateral maternal positions after induction of spinal anesthesia, keeping in view patient satisfaction and comfort along with anesthetist convenience.

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METHODOLOGY

The quasi-experimental study was carried out at Department of Anesthesia, Combined Military Hospital (CMH), Lahore Pakistan, from June to December 2018, after obtaining approval from the Ethics Review Committee of CMH, Lahore, Pakistan. Sample size was calculated by using WHO calculator.

Inclusion Criteria: Female patients aged 18–45 years, in last trimester of pregnancy, with no medical or surgical comorbidities determined at baseline examination were included.

Exclusion Criteria: Patients having contraindications to the regional anesthesia drugs to be used, were excluded.

Nonprobability consecutive sampling was used to enroll 216 patients. Patients were randomly allocated by our study team into two groups of 108. These groups were labelled ‘S-Group’ for Sitting Position or ‘L-Group’ for Lateral Position (Figure-1). Written, informed consent was obtained from all patients. Patient base line heart rate and blood pressure were recorded before the procedure began. Spinal anesthesia was given in L3-L4 or L4-L5 interspace after taking full antiseptic precautions. After infiltration of skin with local anesthetic, 2.5 ml of hyperbaric (0.5%) Lignocaine was injected in the subarachnoid space with 27-gauge pencil point spinal needle. Hamstring stretch modified sitting position was adopted for S-Group patients. In L-Group, patient was supported by an assistant who stood in front of the patient. After spinal anesthesia, patients were immediately placed in supine position with a wedge placed under their right hip. Adequacy of sensory blockage was checked by pin pricks and motor block by modified Bromage Scale. Patients were monitored at timed

minutes with fluid bolus and bradycardia with 0.04 mg/kg of intravenous Atropine. After spinal anesthesia, patients were interviewed regarding their comfort level, in particular spinal induction position, in terms of three grades (comfortable, uncomfortable and agitated). The number of attempts taken by anesthetist for successful sub arachnoid puncture in both positions was also documented.

Statistical Package for Social Sciences (SPSS) version 24.0 was used for the data analysis. Quantitative variables with normal distribution were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

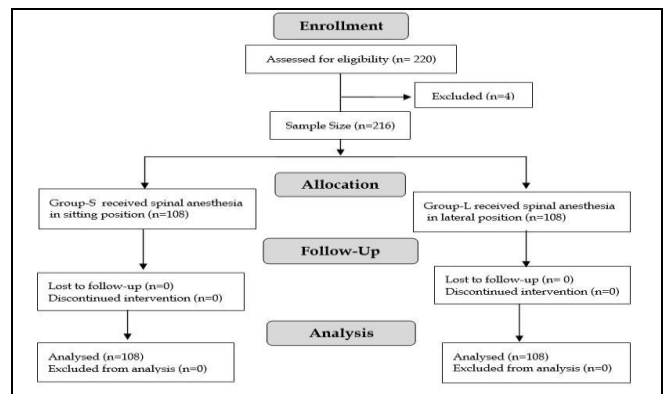


Figure-1 : Patient Flow Diagram (n=216)

RESULTS

A total of 216 patients were recruited into the study, 108 each for S and L group. Demographic features and ASA status were matched in the two groups and presented in Table-I. There was no

Table-I: Patient Demography, (n=216)

Patient Position	Age in years (Mean±SD)	BMI (Kg/m ²) (Mean±SD)	Obstetric Data		
			Gestational Age (Wks) (Mean±SD)	Parity	
				Primiparous	Multiparous (>2)
Lateral (L-Group) n=108	30.0±1.9	30.69±1.5	38.0±1.2	40(37%)	68(63%)
Sitting (S- Group) n=108	31.0±1.2	29.8±2.0	37.0±2.0	45(41.5%)	63(58.5%)

intervals as standardized by American Society of Anesthesiologists. Noninvasive blood pressure and pulse rate was recorded at base level and then every 2 minutes for 15 minutes. Hypotension was defined as systolic BP<90mm Hg or 20% fall in Mean Arterial Pressure and Bradycardia was defined as pulse rate less than 50/minute. Precipitated Hypotension was treated with 0.1 to 0.5 mg of phenylephrine over 10-15

statistically significant differences in obstetric data which includes gestational age, previous pregnancies and caesarian deliveries. After five minutes of induction of spinal anesthesia, S- Group had more frequent hypotensive episodes (55.5%) as compared to L- Group (33%), 4 patients (3.7%) in the L Group had bradycardia whereas 8 patients (7.4%) in S-Group had bradycardia (Table-II). Only 1 patient in S Group

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had an attack of syncope during induction of spinal anesthesia. Most patients (90.7%) in L-Group were relaxed, only 9(8.3%) reported they were uncomfortable. In S-Group, 78 patients (72%) were comfortable, 25(23%) were uncomfortable and 5(4.6%) were agitated, as shown in Table-III. Spinal anesthesia was successfully initiated in first attempt in 94 patients (87%) in S Group whereas in L Group, in 80 patients (74%), it was successful with first attempt and the rest required two or more attempts as listed in Table-IV.

Table-II: Hemodynamic Changes with Adverse Events (n=216)

Patient Position	Hemodynamic Parameters			p value
	Hypotension	Bradycardia	Inj Phenylephrine Administered	
Lateral (n=108)	36(33%)	4(3.7%)	6(5.5%)	0.001
Sitting (n=108)	60(55.5%)	8(7.4%)	13(12%)	

Table-III: Patients Reported Comfort, (n=216)

Patients' Position	Patients' Comfort			p value (<0.05)
	Comfortable	Uncomfortable	Agitated	
Lateral (n=108)	98(90.7%)	09(8.3%)	01(0.92%)	0.0004
Sitting (n=108)	78(72%)	25(23%)	05(4.6%)	

Table-IV: Attempts Made for Spinal Anesthesia, (n=216)

Patients' Position	Number Of Attempts		p-value
	First Attempt	More Than One Attempt	
Lateral (n=108)	80(74%)	28(26%)	0.015
Sitting (n=108)	94(87%)	14(13%)	

DISCUSSION

In our study, patients in the Lateral Group expressed superior comfort level as compared to Sitting Group, particularly obese and laboring patients. Additionally, anesthetists were more comfortable with sitting maternal position and success of subarachnoid puncture in first attempt was also significantly better in Sitting Group. Lateral position showed better hemodynamic stability as compared to sitting position. Hypotension incidence in sitting position (55.5%) was more as compared to lateral group (33%). Bradycardia in sitting position (7.4%) was also more frequent as compared to lateral group (3.7%). This variation in hemodynamics was significant as suggested by p values.

There is inconclusive evidence in literature that induction position (sitting or lateral) may affect spinal anesthesia in terms of its effects on the characteristics of sensory or motor blockade¹¹. In our study, suitable

operating conditions were achieved in both positions, but Lateral position patients showed better hemodynamic stability as compared to sitting group. Fluctuating emotions, which accompany the cesarean delivery, can result in syncope because of vasovagal phenomenon, which occurred in one patient of sitting (S) group, in our study. Spinal anesthesia in a particular maternal position varies with the anesthesiologist's preference based on experience and skills but institutional practices also vary in this regard¹². Practice of obstetric anesthesia in Pakistan's hospitals has also had an evolutionary process following changing international trends as two decades, back general anesthesia was frequently used, after which regional anesthesia became popular for obstetrics in Pakistan, where initially lateral position was commonly adopted and now modified sitting position is more often used than lateral or traditional sitting position as lumbosacral edema in full-term pregnant patients can cause difficulty in identification of midline and bony land marks¹³. Among the three variants of sitting position: traditional sitting position, squatting sitting position, and hamstring stretch sitting position¹⁴, Hamstring stretch sitting maternal position was the most common in our anesthesia practice although in some patients, lateral position is preferred (Figure-2).

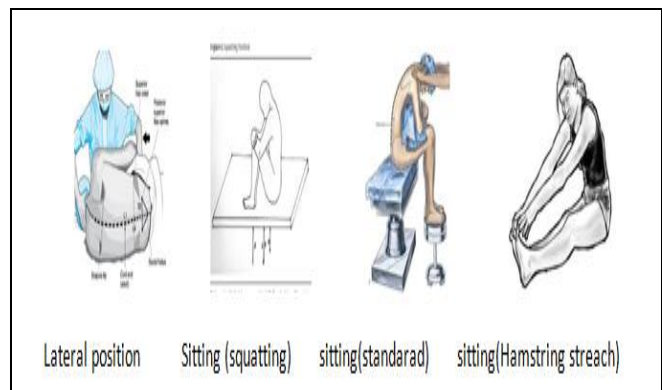


Figure-2: Different Maternal Spinal Positions

A similar study was conducted in India in 2017 by Kharge *et al*, which concluded that induction position for spinal anesthesia does not affect the hemodynamic parameters and incidence of side effects when adequate preload was done, and there was no statistically significant difference in sensory or motor level achieved, however, lateral position appeared to be more comfortable than sitting position ($p<0.001$)¹⁵. A study carried out in Iran demonstrated that maternal

satisfaction for lateral position was superior to sitting position¹⁶. A study conducted in Spain, on the effect of position on maternal hemodynamics during elective cesarean section, concluded that the spinal anesthesia performed in the sitting position with hyperbaric bupivacaine and fentanyl does not influence the incidence of arterial hypotension¹⁷. Another study done in Iran, concluded that it is easier to access interspinous space and dura mater when lumbar lordosis is reduced in sitting position¹⁸. There are only a few conditions where spinal anesthesia is absolutely contraindicated and it can be safely given in sitting or lateral positions provided safety precautions are observed, but general anesthesia will always have a role to play in obstetrics. There is nothing absolute regarding induction position for spinal anesthesia but the quest for a better approach should always be there and further research is warranted in this regard.

LIMITATIONS OF STUDY

The accuracy of patient responses to the researcher was the main limitation of this study. Language barrier was also encountered among the participants. Study participants were also not longitudinally followed for a prolonged duration of time, so more studies are required to see the effects of preferred position at various intervals during postpartum period.

CONCLUSION

Spinal anesthesia when initiated for cesarean deliveries in lateral position gave better hemodynamic stability as compared to sitting position. These patients were more comfortable in lateral position, however sitting position was more convenient for the anesthetist. Skills and success rate in lateral positions can be improved by experience.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

SPB & AH: Data acquisition, data analysis, critical review, approval of the final version to be published.

A & AA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SS & UK: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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