

Lateral versus sitting positions during induction of spinal anaesthesia for elective caesarean section: A Comparative Study

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Abstract:

Introduction: There is a rapid increase in cesarean section rates throughout the world.

Positioning of patients before giving spinal anesthesia has been a topic of immense interest amongst anesthesiologists. Many authors have investigated postures such as left lateral and right lateral positions as well sitting positions during induction of spinal anesthesia and studied the effect of postures on parameters such as spread of sensory blockade, occurrence of hypotension, and incidence of post Dural Puncture Headache. We conducted this comparative study to analyse the effect of positioning (sitting versus lateral) on sensory and motor blockade as well as on hemodynamic stability and incidence of post dural puncture headache (PDPH).

Materials and Methods: 90 women posted for elective cesarean section and belonging to ASA I and II from 1st March 2015 till 28 February 2017 were included in this study on the basis of a predefined inclusion and exclusion criteria. Out of 90 studied cases 45 patients were given Spinal Anesthesia in sitting position (group-A) whereas in remaining 45 patients induction of spinal was done in left lateral decubitus position (group-B). The effect of positioning (sitting versus lateral) on sensory and motor blockade as well as on hemodynamic stability and incidence of PDPH was compared in studied cases. P value less than 0.05 was taken as statistically significant.

Results: Demographic factors such as mean age and weight and ASA grades of the studied cases were found to be comparable with no statistically significant difference between the studied groups ($P > 0.05$). Sensory blockade at 5 minutes and motor blockade at 3 minutes was found to be statistically significantly different in both the groups. There was a drop in mean arterial pressure in patients of sitting group after they were given supine position which is reflected in the readings at 5, 10 and 15 minutes. 9 patients in sitting group and 2 patients in lateral group had bothersome headache. The difference was found to be statistically significant ($P < 0.05$).

Conclusion: Lateral decubitus position as compared to sitting position while doing induction of spinal anesthesia appears to be a better choice for patients undergoing elective cesarean section.

Keywords: -Cesarean section, spinal anesthesia, hemodynamic stability, post dural puncture headache (PDPH)

Introduction:

With advances in the field of obstetrics the incidence of cesarean section is increasing exponentially. Its incidence is particularly high in countries such as dominicon republic(58%), Brazil(55%), Egypt(55%), Turkey(53.1%) and Venezuela(52.4%) where more than half

of the babies are delivered by cesarean section.¹ In developed world the incidence is still high in countries such as US(32%) and Australia(32%). Posturing of patients for giving spinal anesthesia has been a topic of immense interest amongst anaesthesiologists.² Many authors have investigated postures such as sitting and lateral

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positions during induction of spinal anesthesia and the effect of postures on parameters such as spread of sensory and motor blockade, occurrence of hypotension, and incidence of PDPH.³

Hypotension is one of the important side effect of spinal anesthesia in patients undergoing cesarean deliveries. Given that most of the women in developing countries such as those of south east Asia are already having significant amount of anemia the incidence of hypotension is very high.⁴ The factors like pre-existing anemia, compression of aorta by gravid uterus and cephalad migration of local anesthetic drug in subarachnoid space are the key factors in causing hypotension in these patients apart from autonomic blockade. Despite the risk of hypotension neuraxial anesthesia is still preferred over general anesthesia in patients undergoing LSCS because of lack of complications associated with general anesthesia such as need for ventilation, post-operative respiratory complications and complications such as aspiration.⁵ To prevent hypotension in patients undergoing cesarean deliveries prophylactic interventions such as fluid loading, leg elevation, phenylephrine infusion, low dose local anesthetics and different positioning of the patients for spinal anesthesia have all been tried.⁶ Positioning of the patients undergoing cesarean delivery under spinal anesthesia has known to have a bearing on hemodynamic responses.⁷ In these patient's spinal anesthesia can be given in sitting or lateral decubitus, either left or right, position. The posture in which spinal anesthesia is given has a bearing on the way it is spread within spinal canal and cerebrospinal fluid.⁸ There is no consensus as to which is a best position for giving spinal anesthesia in patients undergoing cesarean section and the decision about positioning of patients may depend upon factors related to patient as well as anesthetists' preferences.⁹

Sitting as well as lateral positions have their pros and cons. While sitting position is better from the point of placement of spinal anesthesia because it's easy to identify landmarks for giving spinal anesthesia this position is usually uncomfortable for the patient and it is difficult for a

full-term patient to sit for more than a couple of minutes. Moreover, there are studies which have reported that the incidence of hypotension is more in patients who had been given spinal anesthesia in sitting position. On the other hand, lateral decubitus position though is comfortable for patients and is reported to be associated with less incidence of hypotension but it's difficult to identify landmarks in this position.¹⁰

With this background we conducted this comparative study to analyze effects of sitting and lateral position during induction of spinal anesthesia in patients undergoing cesarean section.

Materials and Methods:

This was a prospective comparative study conducted in the department of anesthesiology of a tertiary care medical institute situated in an urban area. Institutional ethical committee duly approved the study and written informed consent was obtained from all the participants. Total 90 patients were enrolled in this study on the basis of a predefined inclusion and exclusion criteria. Out of 90 patients in 45 patients induction of spinal anesthesia was done in sitting position (group-A) whereas in remaining 45 patients induction was done in lateral decubitus position (group-B).

A detailed history was taken and thorough clinical examination was done in all the cases. All previous investigation were reviewed. Routine investigations such as complete blood count, Hepatitis profile, INR were noted in all the cases. After explaining the purpose of the study an informed consent was obtained from the patients. Before induction baseline parameters such as heart rate, blood pressure and SPO₂ was recorded. After preloading with 500ml Ringer's lactate patients were positioned in either sitting or left lateral decubitus position depending upon randomization. Quincke's spinal needle no:25 was inserted at the level of L3-L4 and 0.5% hyperbaric bupivacaine 12mg was injected. After giving 0.5% hyperbaric bupivacaine patients were placed in supine position. Hemodynamic parameters such as heart rate, systolic and diastolic blood pressures and mean arterial

Table-1: Comparison of demographic factors of the studied cases

Demographic factor	Group A	Group B	P Value
Weight (Kg)	64.72 ± 5.38	62.98 ± 6.12	0.1556 (Not Significant)
Mean Age (Years)	23.12 ± 2.34	22.76 ± 2.12	0.446 (Not Significant)

Table-2: Comparison of sensory blockade in studied cases

Sensory blockade	Sensory level score	Sitting	Lateral	P Value
At 1-Minute	L1	4	7	P> 0.05
	T12	36	33	
	T10	3	5	
	T8	2	0	
	T6	0	0	
At 3- Minutes	T12	3	10	P> 0.05
	T10	32	34	
	T8	6	1	
	T6	4	0	
At 5- Minutes	T10	2	4	P< 0.05
	T8	12	21	
	T6	31	20	
At 20-Minutes	T8	10	15	P> 0.05
	T6	34	30	
	T4	1	0	

Table-3: Comparison of motor blockade in the studied cases

Motor blockade	Motor Level	Sitting	Lateral	P value
At 1-Minute	0	36	40	P=1
	1	8	5	
	2	1	0	
	3	0	0	
At 3- Minutes	0	4	19	P=0.02
	1	26	21	
	2	15	5	
	3	0	0	
At 5- Minutes	0	0	0	P=0.3727
	1	0	5	
	2	15	18	
	3	30	22	
At 20-Minutes	0	0	0	P=0.49
	1	0	0	
	2	0	2	
	3	45	43	

pressures were noted every min for 10 minutes and every 3 minutes till end of surgery. Sensory and motor assessment was done by pinprick and bromage scale respectively. Episodes of hypotension were treated appropriately by fluid boluses or vasopressors depending upon severity of hypotension.

Statistical analysis was done using SPSS 21.0 software and P value less than 0.05 was taken as statistically significant.

Inclusion criteria: Patients more than 18 years of age and undergoing elective cesarean sections. ASA grades I and II. Those Who had given informed written consent. Gestational age 37 weeks or above (full term).

Exclusion Criteria: Those who refused consent. Patients with systemic illnesses such as diabetes, hypertension or bronchial asthma. Gestational age less than 37 weeks. Patients in whom spinal anesthesia was not indicated such as those having thrombocytopenia, local site infection and coagulopathy. Hemodynamically unstable patients. Patients less than 18 years.

Results:

This was a prospective comparative study in which 90 patients belonging to ASA II and undergoing elective cesarean section were included. The patients were divided into 2 groups on the basis of positioning, either sitting or lateral decubitus, during induction of spinal anesthesia. Demographic data of patients in both the groups was compared. Mean age, weight and ASA grades were found to be comparable in both the groups with no statistically significant difference ($P<0.05$) (table-1).

The analysis of sensory level blockade showed that after 1-minute in 36 (80%) and 33 (73.33%) patients' sensory blockade was at T12. After 3-minutes sensory block level was seen at T10 level in 32(71.11%) and 34(75.56%) patients respectively. After 20-minutes' level of sensory blockade reached to T6 level in 34(75.56%) and 30(66.67%) patients respectively. The overall sensory blockade was found to be faster in sitting group as compared to lateral position group. The comparison of highest sensory level achieved showed that only at 5-minutes highest sensory level achieved was statistically significantly higher in sitting group as compared to lateral group ($P<0.05$). At 1-minute, 3-minutes and 20-minutes the sensory blockade levels were found to be comparable in both the groups



Figure 1: Mean heart rate of the studied cases

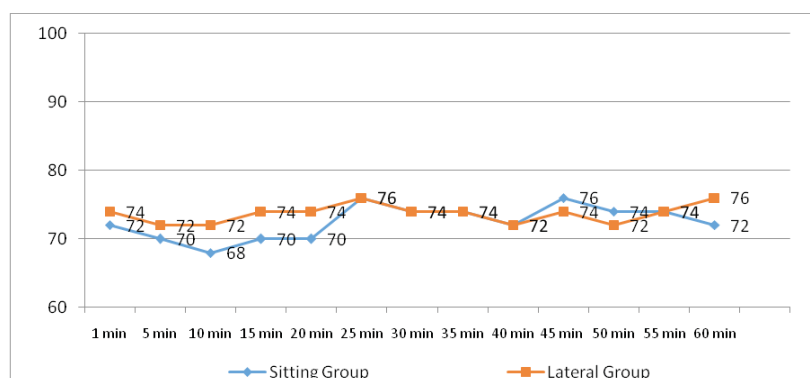


Figure 2: Mean arterial pressure of the studied cases

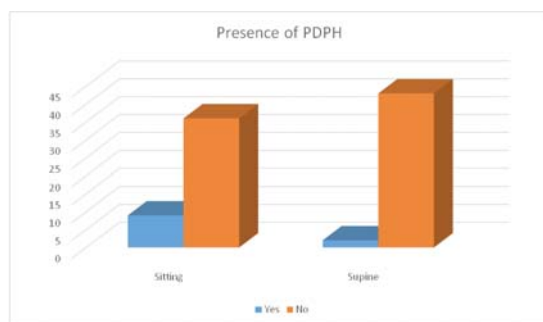


Figure 3: Comparison of PDPH in the studied cases

with no statistically significant difference in between these 2 groups (table-2).

The analysis of motor blockade showed that after 1-minute motor level of 1 was achieved in 8(17.78%) and 5(11.11%) patients respectively. After 3-minutes' motor level of 2 was achieved in 15(33.33%) and 5(11.11%) patients respectively. After 5-minutes motor level of 3 was achieved in 30(66.67%) and 22(48.89%) patients in sitting at lateral group respectively. After 20-minutes all 45(100%) patients had motor level of 3 in sitting group whereas 43(95.56%) patients in

lateral group had motor level of 3. The comparison of both the groups on the basis of degree of motor blockade showed that both the groups were found to be comparable as far as motor blockade was concerned except at 3-minutes were statistically significantly high number of patients in sitting group achieved motor level of 2 as compared to patients in lateral group (table-3).

The analysis of heart rate of the patients in both the groups at different intervals showed that mean heart rates were slightly higher in sitting group (81.13 ± 2.49) as compared to lateral group (79.93 ± 2.02) but the difference was not found to be statistically significant ($P > 0.05$) (Figure-1).

The analysis of mean arterial pressure of the patients in both the groups at different intervals showed that mean arterial pressures were comparable in both the groups with no statistically significant difference in mean arterial pressures of patients in sitting and lateral groups ($P > 0.05$). There was a drop in mean arterial pressure in patients of sitting group after they were given supine position which is reflected in the readings at 5, 10 and 15-minutes (figure-2).

Finally, the comparison of significant PDPH was assessed on next day of cesarean delivery. The analysis of patients on the basis of presence of PDPH showed that 9-patients in sitting group and 2-patients in lateral group had bothersome headache. The difference was found to be statistically significant ($P < 0.05$) (figure-3).

Discussion:

Positioning of patient during spinal anesthesia has been a topic of immense interest amongst various anesthetists. Sitting and lateral positions are the two positions in which spinal anesthesia is given in patients undergoing elective cesarean section. There are various studies who have come up with different conclusions about the effect of sit-

ting versus lateral positioning during induction of spinal anesthesia.

Inglis A et al conducted a comparative study of 40-women presenting for elective caesarean section under spinal anesthesia. These patients were randomly assigned to have anesthesia induced in either the sitting or right lateral position. The onset time and height of the subsequent analgesic and anesthetic block was measured. It took longer to site spinal needles in the lateral position. There was a faster onset of sensory block to the sixth thoracic dermatomal level, in the lateral group, although onset time to T4 was comparable. There was no difference in maximum block height or degree of motor block.¹¹ Similar comparable sensory and motor blockade in sitting and lateral positions were reported by Kharge ND et al¹² and Shahzad K et al.¹³

Obasuyi BI et al conducted a comparative study of 100 patients undergoing elective caesarean section. The patients were randomized to receive spinal anesthesia in the lateral position (group-L) or the sitting position (group-S). Using the L3-4 interspace, patients received intrathecal plain bupivacaine, 10mg or 12mg according to their height, after which they were placed immediately in the supine position with left uterine displacement. Maternal blood pressure was measured every minute for 10 min, every three min for 20min and 5-minutely thereafter. Hypotension was defined as a fall in systolic blood pressure >20% or a value <90mmHg. here was no difference in the lowest recorded systolic blood pressure in group-L (99.2 ± 8.9 mmHg) compared with group-S. However, the lowest recorded mean arterial pressure was greater in group-L than in group-S. Obasuyi BI et al conclude that the incidence of hypotension was lower in group-L than in group -S.¹⁴

Maryam Davoudi et al conducted a study to compare the incidence of post dural punc-

ture headache (PDPH) following spinal anesthesia in the sitting position and in the left lateral decubitus position in patient who underwent elective caesarian section. Patients were interviewed for PDPH on either post-operative day one, two, or three. The incidence and intensity of PDPH were evaluated and compared using a numeric rating scale (NRS-11). The overall incidence of PDPH was 12.7%. In the sitting group, 10 patients (20.8%) had PDPH, compared with 2 patients (4.3%) in the lateral group ($P = 0.017$). Davoudi M et al concluded that spinal anesthesia in the sitting position was more associated with significant PHDH than that in the left lateral decubitus position for patients undergoing elective caesarian section.¹⁵ These findings were comparable to the study undertaken by us since we also found that there was a statistically significant higher incidence of PDPH in patients in whom induction of spinal anesthesia was done in sitting position as compared to supine position.

Conclusion:

Lateral decubitus position as compared to sitting position while doing induction of spinal anesthesia appears to be a better choice for patients undergoing elective cesarean section. It is associated with comparatively stable mean arterial pressure value throughout surgery and less incidence of post-dural puncture headache.

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Role and contribution of authors:

Dr. Razia Husain, conceived the study, data collection and manuscript writing

Dr. Saira Jamshed, Manuscript writing, design the study and wrote discussion

Dr. Farah Khan, wrote introducton and collect-

ed the references

Dr. Sariya bin Naseem Khan, helped in discussion writing and literature search

Dr. Zainab S Khan, helped in statistical analysis and critically review the article

Dr. Munira Murtaza Khomusi, helped in collection of data and references.

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