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ORIGINAL ARTICLE

Comparative Study Between Sitting and Left Lateral Position for Spinal Anesthesia in Elective Cesarean Sections

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Abstract

Background: **Both spinal anesthesia and general anesthesia have risk−benefit profiles that strongly favor spinal anesthesia for the majority of pregnant women. The study considers the potential for clinically significant maternal hemodynamic derangements, difficult airway management, stroke, and adverse neonatal outcomes.**

Aim: **To compare the sensory and motor blockade, hemodynamic changes, nausea and vomiting, duration of the technique, and patient satisfaction of two distinct positions used to induce spinal anesthesia during a cesarean section.**

Patients and methods: **This is a prospective, randomized, uncontrolled trial conducted at Al-Azhar University Hospitals (Assiut) on 80 pregnant women scheduled for an elective cesarean section under spinal anesthesia from September 2021 to May 2022.**

Results: **According to the modified Bromage score, the parturients who received intrathecal spinal anesthetics in the lateral position had faster sensory blockade than those who received spinal anaesthetics in the sitting position. However, they had the same level of sensory blockade and degree of motor block. In terms of how long the procedure took, we noticed that spinal anesthesia took longer in the lateral group than in the sitting group. The parturient finds the sitting position during spinal anesthesia to be more convenient than the lateral position ($P = 0.0035$). There was a nonsignificant difference in the incidence of hypotension, bradycardia, and the requirement for ephedrine between the two groups that were being studied.**

Conclusion: **In spinal anesthesia for a cesarean section, the sitting position is more comfortable than the lateral position.**

Keywords: Elective cesarean section, Sitting and left lateral position, Spinal anesthesia

1. Introduction

When vaginal delivery poses a threat to either the mother or the child, a cesarean section is recommended. When deciding whether a cesarean section is necessary for umbilical cord prolapse, uterine rupture, placental problems, abnormal presentation, unsuccessful labor induction, etc., the obstetrician must exercise discretion in many instances.[1] The choice of anesthesia for a caesarean delivery is influenced by the process indicator, urgency, partial desire, and the skills of the anesthesiologist and the surgeon.[2] There are numerous reasons to use general anesthesia. A few examples include situations where regional anesthesia is not recommended, requests from the mother, and life-threatening fetal compromise when there is not enough time to perform a regional technique.[3] Although spinal or epidural anesthesia can be used to accomplish this, spinal anesthesia is an easy method with a low failure rate, rapid onset, and low drug dose.[4] It could be caused by the gravid uterus compressing the aorta and the cephalad spreading local anesthetic into the subarachnoid space.[5] Regional anesthesia is the most common type of anesthesia used for caesarean sections because it

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avoids the risks of general anesthesia. The use of vasopressors, fluid loading, and left lateral uterine displacement are preventative measures that can lower the risk of hypotension. The parturient's position during and immediately following subarachnoid anesthesia has an impact on these variables.[6] In spite of these preventative measures, hypotension has been found to occur 30–90 % of the time. Maternal position may speed up the onset of sensory block.[7]

The goal of this study was to compare how sensory and motor blockade, hemodynamic changes, nausea and vomiting, technique duration, and patient satisfaction were affected by sitting versus left lateral positions during spinal anesthesia induction during a caesarean section.

2. Patient and methods

After receiving a written informed consent from each participant and approval of the Local Ethics Committee, this prospective, randomized, uncontrolled trial was conducted at Al-Azhar University Hospitals (Assiut) on 80 pregnant women scheduled for an elective cesarean section under spinal anesthesia from September 2021 to May 2022. The sample size was calculated according to **Chevuri *et al.*,**[8] which included 80 women. The American Society of Anaesthetists (ASA) physical status I and II, age between 21 and 34 years, and elective parturients (nonurgent patients) were all included. However, induced or preexisting hypertension, diabetes mellitus, contraindications to spinal anesthesia, polyhydraminos and oligohydraminos, multipara, morbid obesity, and parturients were randomly divided into two equal groups of 40 babies. The seated group, Group I: Using 2 mL (10 mg) of 0.5 % hyperbaric bupivacaine (Sunny Group Company, Egypt) and 0.5 mL (25 g) of fentanyl (Hameln Pharma Gmbh, Germany), 40 pregnant women underwent spinal anesthesia in the sitting position. The second, or lateral, group: A spinal anesthetic containing 2 mL (10 mg) of 0.5 mL

Table 1. Comparison between the two studied groups according to demographic data.

Patient no.	Age (years)		Weight (kg)		Height (cm)	
	Group I	Group II	Group I	Group II	Group I	Group II
Min	17	17	74	79	157	151
Max	34	37	102	102	175	174
Mean	26.5	27.45	89.28	89.33	166.35	166.08
SD	4.38	4.77	7.21	7.42	5.04	5.43
P value	0.356446		0.975695		0.814981	

Table 2. Comparison between the two studied groups in systolic arterial blood pressure.

Systolic blood pressure (mmHg)																				
	Baseline	Before delivery														After delivery				
		2 min.	4 min.	6 min.	8 min.	10 min.	12 min.	14 min.	16 min.	18 min	20 min	22 min	24 min	26 min	28 min	5 min.	10 min.	15 min.	20 min.
Group I																			
Min	105	100	87	78	87	84	89	92	90	96	89	88	83	90	103	89	91	102	101
Max	139	123	125	133	131	127	132	124	127	124	123	128	134	124	123	126	124	128	127
Mean	123.68	111.03	105.23	106.53	106.4	108.13	108.6	109.28	110.4	110.6	110.63	111.5	110.35	112.1	114.5	112.83	112.5	116.33	115.35
SD	8.87	7.27	8.4	13.61	11.68	10.77	10.3	8.64	8.35	8.06	8.03	10.14	10.58	7.15	4.83	8.59	8.74	7.81	6.74
Group II																			
Min	105	88	86	78	83	85	93	19	91	94	92	92	91	87	100	85	79	86	82
Max	136	125	124	133	129	127	124	124	127	124	121	127	130	124	123	127	127	128	130
Mean	121.05	110.23	104.43	105.68	105.33	105.7	108.1	105.08	108.08	109.38	110.1	110.23	110.25	110.15	110.95	110.03	111.15	114.63	112.73
SD	9.23	8.93	7.94	10.98	9.94	10.38	8.55	15.91	7.38	7.21	7.09	8.49	8.51	8.07	5.79	9.8	10.7	9.58	9.29
P value	0.199	0.662	0.663	0.759	0.659	0.308	0.814	0.146	0.191	0.476	0.757	0.544	0.963	0.256	0.004	0.178	0.538	0.387	0.152

Table 3. Comparison between the two studied groups according to hypotension.

	Group I	Group II	*P*
Hypotension			
No	28 (70 %)	23 (57.5 %)	0.244
Yes	12 (30 %)	17 (42.5 %)	

(25 mg) of fentanyl and 0.5 % hyperbaric bupivacaine was administered to 40 expecting mothers in the left lateral position.

The liver, prothrombin time, activated partial thromboplastin time, complete blood picture enzymes, serum urea and creatinine, and fasting blood sugar were all part of the preoperative assessment. The assessment also included history taking, carrying out a thorough physical examination, and carrying out tests in the laboratory. An electrocardiogram (ECG) measures heart rate and rhythm. Oxygen saturation (SpO2) and arterial blood pressure (bpm) were measured non-invasively before anesthesia. After receiving intravenous metoclopramide and the H2 blocker Famotidine, parturients received intravenous Ringer's solution (8 ml/kg) as a volume preload infused over 15–20 min. Oxygen was given to the patients through a face mask with a flow rate of 4 l/min. Assessment of sensation: The sensory level was measured bilaterally by losing sensation to a pinprick with a 25-gauge syringe in the anterior axillary line. At this point, it was decided that a sensory block to the T5 dermatome bilaterally was enough for surgery, and it was done every 2 min until the block height stopped rising for 4 min. The intraoperative discomfort was alleviated with 1 μg/kg of fentanyl (Fentanyl, hameln pharma Gmbh – Germany). The data were analyzed using IBM SPSS version 20.0 until the maximum motor block was reached, at which point assessments were performed every 2 min and every half hour until motor grade 0 was reached. The use of percentages and numbers was made for qualitative data. Mean, standard, and median were used to describe the quantitative data range (minimum and maximum). The Chi-square test was used to compare categorical variables between the various groups.

Table 4. Comparison between the two studied groups according to ephedrine requirement.

Patient no.	Ephedrine requirement (mg)	
	Group I	Group II
Min	5	6
Max	24	24
Mean	17.88	19.61
SD	5.69	4.26
P value	0.31	

Table 5. Comparison between the two studied groups according to heart rate.

Patient No.	Heart rate (beat/min.)																			
	Baseline	Before delivery														After delivery				
		2 min.	4 min.	6 min.	8 min.	10 min.	12 min.	14 min.	16 min.	18 min.	20 min.	22 min.	24 min.	26 min.	28 min.	5 min.	10 min.	15 min.	20 min.
Group I																				
Min	62	61	59	56	53	57	56	62	58	62	60	63	68	62	61	60	61	61	59	
Max	99	109	111	104	100	98	103	109	109	115	107	100	107	111	109	101	109	105	116	
Mean	81.55	81.9	80.7	79.9	79.6	79.95	80.05	83.8	84.08	86.18	85.2	83.53	83.58	84.63	79.73	83.48	86.33	83.95	84.9	
SD	9.94	10.84	12.52	12.79	14.43	12.22	13.53	13.38	12.73	13.91	11.54	10.32	11.15	13.43	14.29	12.14	11.73	11.28	13.27	
Group II																				
Min	60	59	53	52	56	57	64	58	53	53	52	56	54	54	61	62	61	61	63	
Max	98	105	105	112	110	113	109	105	111	109	115	115	110	106	97	110	111	105	111	
Mean	80.68	82.8	81.65	81.03	83.35	82.8	84.08	82.28	83.03	82.73	84.38	81.58	83.55	80.13	82.4	83.3	84.6	83.25	83.5	
SD	11.3	15.04	15.52	17.01	14.54	13.95	12.34	13.26	17.21	14.56	14.16	14.09	17.65	14.8	11.44	13.93	14.11	11.87	11.37	
P value	0.714	0.76	0.764	0.739	0.251	0.334	0.168	0.61	0.757	0.282	0.776	0.482	0.994	0.158	0.358	0.952	0.554	0.788	0.614	

Table 6. Comparison between the two studied groups according to bradycardia and tachycardia.

	Group I	Group II	*P*
Bradycardia			
No (≥60)	32 (80 %)	33 (82.5 %)	0.77
Yes (<60)	8 (20 %)	7 (17.5 %)	
Tachycardia			
No (≤100)	28 (75 %)	20 (50 %)	0.068
Yes (>100)	12 (25 %)	20 (50 %)	

3. Results

There was no statistically significant difference between the two groups in terms of parturient ages ($P = 0.356$), weights ($P = 0.976$), or height ($P = 0.815$). There was no significant difference between the two groups in terms of systolic blood pressure, the prevalence of hypotension ($P = 0.244$), the requirement for ephedrine ($P = 0.31$), heart rate, and the prevalence of bradycardia ($P = 0.77$) or tachycardia ($P = 0.068$). When the two groups studied were compared, there was a significant difference with Group II experiencing a faster block onset (*P* value = 0.002). There was no significant difference between the two groups studied in terms of the degree of motor block and maximum sensory block. Compared with the sitting group, the lateral group performs the technique for a significantly longer period of time ($P = 0.001$). During spinal anesthesia, the parturient feels more at ease sitting down than in the lateral position ($P = 0.0035$) (Tables 1–14).

4. Discussion

In this study, 40 pregnant women were divided into two groups to compare the hemodynamics and block characteristics of two distinct positions—sitting and left lateral—during spinal anesthesia induction during a cesarean section. Age, weight, height, hemodynamics, and hypotension did not statistically differ between the patients in this study.

Table 8. Comparison between the two studied groups according to time to reach T5 dermatome.

Time to reach T5 dermatome	Group I	Group II	MCp
6 min.	3 (7.5 %)	17 (42.5 %)	0.0002
8 min.	10 (25 %)	15 (37.5 %)	
10 min.	17 (42.5 %)	8 (20 %)	
12 min.	10 (25 %)	0 (0.0 %)	

Similar to the current study by **Chevuri *et al.*,[8] Ortiz Gomez *et al.*[9] and Coppejans *et al.*[10]** conducted a prospective, randomized, and controlled trial with 75 pregnant women to compare the spinal block characteristics of the left lateral, modified lateral, and sitting positions for cesarean sections. Both of these studies looked at the effect of maternal position on maternal hemodynamics during elective cesarean delivery under spinal anesthesia. During the initiation of small-dose combined spinal epidural anesthesia (CSE), they compared the sitting position to the lateral position. While the lateral group had a significantly higher incidence of hypotension than the sitting group, there was no significant difference in the changes in hemodynamics between the studied groups. Bradycardia can be treated without atropine in this study. According to the current research, **Ortiz Gomez *et al.*,[9] Chevuri and others,[8] and Prakash *et al.*[11]** discovered that there was no significant difference in heart rate between the studied groups. The lateral group required a greater total amount of ephedrine than the sitting group in this study. **Ortiz Gomez *et al.*[9]** found that neither group required a significantly

Table 9. Comparison between the two studied groups according to maximum sensory level.

Maximum sensory level	Group I	Group II	MCp
T2	0 (0.0 %)	5 (12.5 %)	0.111
T3	13 (32.5 %)	15 (37.5 %)	
T4	27 (67.5 %)	20 (50 %)	

Table 7. Comparison between the two studied groups according to sensory block.

	Sensory block (Thoracic Dermatome)									
	2 min.	4 min.	6 min.	8 min.	10 min.	12 min	14 min	16 min	18 min	At the end
Group I										
Min	9	6	5	4	3	3	2	2	2	4
Max	14	12	10	9	7	6	5	5	5	6
Mean	11.6	9.7	7.8	6.15	4.98	4.68	3.65	3.63	3.48	5.08
SD	1.08	1.18	1.18	1.23	0.92	0.76	0.95	0.81	0.75	0.62
Group II										
Min	8	6	4	3	3	2	1	1	2	4
Max	14	12	9	7	6	6	5	5	5	6
Mean	10.8	8.55	6.33	5.15	4.5	3.93	3.35	3.33	3.28	5
SD	2.07	1.54	1.29	1	0.82	0.83	0.89	0.89	0.93	0.75
P value	0.03	<0.001	<0.001	<0.001	0.02	<0.001	0.15	0.12	0.29	0.63

Table 10. Comparison between the two studied groups according to motor block.

Patient no.	Motor block (Bormage scale)									
	2 min.	4 min.	6 min.	8 min.	At the end	30 min.	60 min.	90 min.	120 min.	150 min.
Group I										
Min	1	2	2	3	3	2	2	1	0	0
Max	2	3	3	3	3	3	2	2	1	0
Mean	1.33	2.33	2.82	3	3	2.36	2	1.51	0.69	0
SD	0.48	0.48	0.39	0	0	0.49	0	0.51	0.47	0
Group II										
Min	1	2	2	3	3	2	1	1	0	0
Max	2	3	3	3	3	3	2	2	1	0
Mean	1.26	2.26	2.95	3	3	2.21	1.95	1.33	0.64	0
SD	0.44	0.44	0.22	0	0	0.41	0.22	0.48	0.49	0
P value	0.465	0.465	0.079	1	1	0.147	0.156	0.118	0.638	1

Table 11. Comparison between the two studied groups according to the duration of technique.

Patient no.	Duration of technique (seconds)	
	Group I	Group II
Min	62	130
Max	115	363
Mean	86.75	234.65
SD	15.84	73.38
P value	<0.001	

Table 12. Comparison between the two studied groups according to nausea and vomiting.

Patient no.	Nausea and vomiting	
	Group I	Group II
No	33 (82.5 %)	30 (75 %)
Yes	7 (17.5 %)	10 (25 %)
P value	0.41	

Table 13. Comparison between the two studied groups according to patient's satisfaction.

Patient no.	Patient's satisfaction	
	Group I	Group II
Not comfortable	12 (30 %)	25 (62.5 %)
Comfortable	28 (70 %)	15 (37.5 %)
P value	0.0035	

Table 14. Comparison between the two studied groups according to APGAR score.

APGAR score	Group I	Group II	MW	*P*
1 min.				**0.588**
Min.	7.0	7.0		
Max.	10.0	10.0		
Mean ± SD	9.60 ± 0.88	9.57 ± 0.86	0.542	
Median	10.0	10.0		
15 min.				**0.715**
Min	8.0	8.0		
Max	10.0	10.0		
Mean ± SD	9.72 ± 0.59	9.71 ± 0.56	0.365	
Median	**10.0**	**10.0**		

different total amount of ephedrine in the current study. **Inglis and others**[12] found that the lateral group needed more ephedrine in the first 10 min after spinal injection due to the faster onset of block at this time, according to the total ephedrine requirement results. All of the pregnant women in our study had sensory block by at least T4, and the lateral group had it much sooner than the sitting group. The sensory blocks in the lateral group did not significantly extend beyond the T3 dermatome. However, the degree of obstruction in the motor block was the same in both groups. **Russell *et al.***[13] compared the Oxford, right lateral, and sitting positions in a randomized study of 90 women presenting for an elective caesarean section under combined spinal and epidural anesthesia. Block height did not differ significantly between the studied groups. In this study, the anesthetist is more comfortable sitting down and can identify landmarks with greater ease. According to the current study by **Inglis *et al.*,**[12] the lateral position required significantly more time to remove the spinal needle than the sitting position. In the current study, there was no statistically significant difference in the frequency of nausea and vomiting between the two groups. In the current study, **Ortiz Gomez *et al.***[9] discovered that there was no significant difference in the frequency of nausea and vomiting among the two groups. In the current study, **Inglis *et al.***[12] discovered that there was no statistically significant difference in the frequency of nausea and vomiting among the two groups. During spinal anesthesia during a cesarean section, the sitting position was found to be more comfortable for the pregnant woman in this study than the lateral position.

According to findings of the **Ortiz Gomez *et al.***[9] study, the parturient is more comfortable and easier to anesthetize while seated. Between 1 and 5 min, the two groups' APGAR scores did not significantly differ.[14]

4.1. Conclusion

Therefore, our study proved that both sitting and lateral positions achieved satisfactory sensory and motor blockade during spinal anesthesia induction during a cesarean section. The sitting position is more comfortable than the lateral position during spinal anesthesia for a cesarean section.

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All authors have a substantial contribution to the article.

Conflicts of interest

The authors declared that there were no conflicts of interest.

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