

## Comparison of Sitting and Lateral Position for Spinal Anesthesia for Orthopaedic Lower Limb Surgeries: An Observational Study

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### Abstract

**Background:** Spinal anesthesia is a frequently used technique for lower limb surgeries. Spinal anesthesia gives a faster onset of analgesia and relaxation of the lower limb muscles. Lower limb surgery especially for treating fractures poses a challenge to the anesthesiologist during the centri-neuraxial block. The primary problem is difficult positioning due to pain. There are two main types of positioning for spinal anesthesia, lateral and sitting. Lateral can be left lateral or right lateral depending on the affected side with the affected side usually kept above to decrease pain. Sitting position can be with the legs kept straight on the table or sitting to one side of the table with the legs hanging down freely. After giving spinal anesthesia the patient is positioned supine or lateral depending on the type of surgery. There are a lot of studies about the effects of different position on spinal anesthesia is abundant especially those for cesarean section. But the effect of position on spinal anesthesia for orthopedic patients is practically nil. Hence the present study is expected to give conclusions that may trigger further research.

**Methods and Material:** After obtaining institutional ethical committee clearance, a prospective observational study among 62 participants were recruited for this study. The patients undergoing spinal anesthesia for lower limb orthopedic surgery were recruited in this study.

**Statistical Analysis:** Data collected was entered in a Microsoft excel data sheet and was analysed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Chi-square was the test of significance. Continuous data will be represented as mean standard deviation. Independent t test was the test of significance to identify the mean difference between the two groups. p value <0.05 was considered statistically significant. All statistical and analyses were carried out using the software Statistical Package for the Social Sciences (SPSS) Statistics version 19.0.0 with the help of a professional statistician. Data was expressed in its frequency and percentage as well as mean and standard deviation.

**Results:** Analysis of the monitored data shows that time taken for attaining adequate sensory block i.e. T10 level, height achieved in each position defined as the dermatome level blocked at the end of five minutes after the procedure assessed by response to cold spirit cotton stimulus, incidence of hypotension in each position defined as more than 20% fall in pre procedural mean arterial pressure, were not significantly different in both the positions of spinal anesthesia. But the time taken for the procedure defined as the time from start of

positioning to the end of the spinal procedure, and the number of attempts for spinal was significantly less for sitting position.

**Conclusion:** Sitting position for spinal anaesthesia takes less time, and a smaller number of attempts for the procedure, compared to lateral position.

**Keywords:** Spinal Anesthesia, Positioning, Lateral, Sitting.

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## Introduction

Spinal anesthesia is a frequently used technique for lower limb surgeries. Spinal anesthesia gives a faster onset of analgesia and relaxation of the lower limb muscles.

Lower limb surgery especially for treating fractures poses a challenge to the anesthesiologist during the centrineuraxial block.. The primary problem is difficult positioning due to pain. There are two main types of positioning for spinal anesthesia, lateral and sitting. Lateral can be left lateral or right lateral depending on the affected side with the affected side usually kept above to decrease pain. Sitting position can be with the legs kept straight on the table or sitting to one side of the table with the legs hanging down freely. After giving spinal anesthesia the patient is positioned supine or lateral depending on the type of surgery.

### Rationale of the study

There are a lot of studies about the effects of different position on spinal anesthesia especially for cesarean section. But the effect of position on spinal anesthesia for orthopedic patients is very less. Hence the present study is expected to give conclusions that may trigger further research.

The combined spinal epidural anesthesia was described by Soresi [1] in 1937 in the United States and was first performed by Curelaru [2] in 1979.

Positioning is very important for successful spinal and epidural anesthesia. Improper positioning can cause multiple attempts with spinal and epidural needle

which increases the risk of hematoma, injury to ligaments and bone, chance of inadvertent dural puncture and post dural puncture headache.

Most commonly adopted position include lateral and sitting positions. [3-5]

Coppejans HC, Hendrickx E, Goossens J, Vercauteren MP did a study on sitting versus right lateral position during combined spinal-epidural anesthesia for cesarean delivery block characteristics and severity of hypotension and concluded that conclude that performing a CSE technique for cesarean delivery in the sitting position was technically easier and induced less severe hypotension. [6]

PKS Laithangbam et al did a study on Comparison of the lateral, Oxford and sitting positions for combined spinal and epidural anesthesia for elective caesarean section and concluded that the lateral position had the least requirement for epidural supplementation but required more vigilance because of faster and higher block and tendency for more episodes of hypotension. [7]

Rukclidge MW et al did a comparison of the lateral, Oxford and sitting positions for performing combined spinal-epidural anaesthesia for elective Caesarean section and they found no advantage of one position over the other. [8]

Tashayod et al. a kind of modified sitting position with maximum extension of knees, adduction of hips, and forward bending (hamstring stretch position, HSP) was described as more effective in reducing lordosis of lumbar spine and

making spinal puncture easier. Even moderate passive knee extension of a patient in a sitting position can increase hamstring tension, tilt the pelvis, and reduce lumbar lordosis. [9]

Inglis A et al did study on comparison of right lateral and sitting positions during spinal anesthesia for cesarean and found that lateral position resulted in higher block and had more incidence of hypotension. [10]

Russel R et al studied a randomized comparison of Oxford, lateral and sitting positions for combined spinal epidural anesthesia for caesarean section and failed to show any significant difference between different positions with respect to height of block, or hypotension. [11]

### Materials & Methods

After getting approval from the institutional research and ethics committee 31 participants for each group were recruited for the study. Patients were educated about the study using patient information sheet. Informed written consent was taken from all patients in their mother tongue.

Patients were kept nil per oral for 8 hours prior to surgery. The patients were given Tab. Ranitidine 150 mg and Tab Metoclopramide 10 mg PO on the night before surgery and at 6am on the day of surgery.

Upon arrival in the operating room ECG, noninvasive blood pressure monitor, and pulse oximeter were connected and basal heart rate and BP were recorded. Intravenous access with 18 G cannula in forearm was obtained and intravenous fluid 0.9% NS was started.

The patient received spinal anesthesia in either lateral or sitting position under strict aseptic precautions. For the lateral position

patient were in either right or left lateral depending on the side of fracture, with the fractured side above. In sitting position patients were sitting on the table with straight legs.

After cleaning with betadine 10%, the lumbar area of the patient was covered with a sterile hole towel. Under strict asepsis, the anesthesiologist detected L3-L4 intervertebral space. The skin over the space was anesthetized with 2ml 2% lidocaine. Using a 25 G spinal needle Dural puncture was done and after aspiration and confirming free CSF flow into the syringe 3 ml 0.5% Inj. Bupivacaine heavy and 20 mcg Inj. fentanyl (0.4 ml) was injected into the subarachnoid space.

The starting time of positioning of the procedure was noted, and the duration of the procedure was also noted. After the spinal injection patient was positioned supine. The number of attempts for spinal anesthesia, time taken for achieving T10 level sensory block, the peak sensory level at five minutes, the incidence of hypotension, were noted. Each episode of hypotension was treated with 6 mg Mephentermine intravenously.

### Statistical Analysis

Data was entered into a Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Chi-square was the test of significance. Continuous data was represented as mean and standard deviation. Independent t test was the test of significance to identify the mean difference between the two groups. p value <0.05 was considered statistically significant.

### Results

**Table 1: Time taken for T10 level**

Position for Spinal	Time for T10 level (Seconds)	P value
Lateral	204	0.061
Sitting	199	

The difference in finding of both methods were not significant (p value >.05)

**Table 2: Level achieved in 5 min.**

Position	Max Level T10	Max Level T8	Max level T6	P value
Lateral	28	2	1	0.421
Sitting	27	3	1	

Max level achieved in both methods were not different (p value >0.05)

**Table 3: Incidence of hypotension**

position	Mean arterial pressure	SD	N	P value
Lateral	88.9	8.6	31	0.724
Sitting	84.6	8.3	31	

The mean arterial pressure changes were not significant.

**Table 4: Time taken for the procedure**

0	Mean Time (S)	SD	N	P value
Lateral	254	9.6	31	0.001
Sitting	187	6.3	31	

The time taken was significantly less for sitting position

**Table 5: Number of attempts**

0	Mean attempts (S)	SD	N	P value
Lateral	2.7	9.6	31	0.001
Sitting	1.2	6.3	31	

Number of attempts were significantly lower among sitting position

## Discussion

The positioning for spinal anesthesia in orthopedic lower limb surgery is very important. The patients will be having severe pain before spinal anesthesia and hence a quick procedure with minimum number of attempts is favored. At the same time, the level of spinal anesthesia, cannot be compromised. The positioning should be acceptable to the patient with no discomfort.

Study by Khurram Shahzad et al showed that the onset of spinal anaesthesia was faster in the sitting than in the lateral

position (4.5 vs 5.4 minutes). This result is in agreement with the present study. [12]

A study by Nahid Manouchehrian et al, Comparing the effect of spinal anesthesia in sitting and lateral positions on the onset time of sensory block and hemodynamic effects in cesarean Section showed mean systolic and diastolic blood pressures, and Mean Arterial Pressure (MAP) of patients under spinal anesthesia in the sitting position in minutes 6 and 8 after anesthesia were significantly lower than those of patients in the lateral position. These findings are not in line with the present study which showed no significant difference in blood pressure. But the onset time of the sensory block was lower in the sitting position, than in

the lateral position consistent with the present study.

The study by Muhammad et al. [13] which was performed on 130 pregnant women undergoing cesarean sections under spinal anesthesia using hyperbaric bupivacaine in the sitting and lateral positions, showed that the occurrence of hypotension in the lateral position was significantly less frequent than that in the sitting position (30.7% vs. 52.3%). The findings of the present study about the incidence of hypotension are not consistent with Muhammad et al study which showed no significant difference.

In Ortiz-Goez et al. study [14] of 252 pregnant women candidates for elective cesarean sections under spinal anesthesia in three positions of sitting and lateral (right and left sides), the incidence of hypotension was 50.7% in the sitting position, 60% in the lateral position (left side), and 69.2% in the lateral position (right side). There was no difference between the three groups regarding the incidence of hypotension. In the current study, the incidence of hypotension was similar in sitting and lateral position consistent with Ortiz Goez et al study.

In a study conducted by Inglis et al. [15] on 40 pregnant women candidates for cesarean sections under spinal anesthesia in the lateral and sitting positions, the sensory block up to T10 developed faster in the lateral group than in the sitting group. The maximum block height, motor block, and hemodynamic condition in both groups showed no difference, and is in agreement with the present study regarding hemodynamic changes. Contrary to the Inglis et al. study, the sensory block up to T10 formed faster in the sitting than in lateral position in our study.

Consistent with our study, in a study conducted by Xu et al. [16], there was no significant difference in hypotension incidence and mean arterial pressure reduction between pregnant women

candidates for elective cesarean sections under spinal anesthesia in the sitting and lateral positions.

In Shahzad et al. study [12] of 70 patients older than 60 years (male and female) who were candidates for lower abdomen and pelvis surgery under spinal anesthesia in the sitting and lateral (right) positions, the two groups were similar in the heart rate, systolic and diastolic blood pressures 20 minutes after spinal anesthesia, and the onset time of anesthesia was faster in the sitting position group. These findings are consistent with our study.

### Conclusion

As per the analysis of the obtained data, the following conclusions were reached. 1) The time taken to achieve T10 level of block was similar in both groups. 2) The highest level of spinal anesthesia achieved after 5 minutes was statistically similar in both the groups. 3) The incidence of hypotension was similar in both the groups. 4) The number of attempts at spinal anesthesia was significantly lower for sitting position group. 5) The time taken for achieving a successful spinal procedure was significantly lower for sitting group of spinal anesthesia than the lateral group.

### Disclosures

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