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ORIGINAL RESEARCH

Comparative study of sitting versus lateral position for induction of spinal anesthesia in elderly patients

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ABSTRACT

Introduction: Spinal anesthesia is one of the most common methods of sensory and motor blockade used worldwide, to provide regional anesthesia. It is mainly used for surgeries involving the lower limbs and the abdominal region below the level of the umbilicus.It involves injecting a drug, usually a local anesthetic agent into the subarachnoid space. The subarachnoid space contains the cerebrospinal fluid (CSF) which bathes the spinal roots and the spinal cord completely. The number of elderly patients presenting for surgery has increased exponentially in recent years and spinal anaesthesia appears to be more beneficial in these patients for infraumbilical surgeries. Spinal anaesthesia can be initiated with the patient in either the sitting or the lateral position, and each position has its advantages and disadvantages. **Materials and method:** This is a Cross sectional and comparative study was conducted in the Department of Anaesthesiology, Chirayu Medical College & Hospital, Bhopal M.P over a period of 1 year.Patients of age group more than 60 years who had to undergo infraumblical surgeries requiring spinal anesthesia at department of Anesthesia at Chirayu Medical College & Hospital, Bhopal were included in the study.Patients were fully informed by investigator in their mother tongue about the anesthetic procedure with the aims and objectives of the study along with a written informed consent was taken from all participants for the study. **Result:** In our study, Mean SBP was higher in Group-B as compared Group-A, at all-time interval except at 30min. and 40 min. It was also found that statistically insignificant difference were observed at time interval at 30 min.and 40 min. and rest of the interval, statistically significant difference was observed between two groups.($p<0.001$).Highest level of sensory block was achieved at T10 and T12 (40% respectively)**,** followed by T8 (20.0%) in group A while in group-B, highest was at T10 (60%) followed by T8 and T12 (20% each). Similarly duration of sensory block was observed 70.8 ±10.02 and 122.8 ±2.74 min. in Group-A and Group-B respectively with highly statistically significant difference ($p <0.0001$). In all parameters of sensory block higher time values were observed with highly statistically significant difference ($p <0.0001$). **Conclusion:** The present study indicates that Induction position for spinal anesthesia does not greatly affect the hemodynamic parameters and block characteristics. However, lateral position appears to be more comfortable for elderly patients in comparison to sitting position undergoing spinal anaesthesia.

Keywords: Spinal Anesthesia, Sitting Position, Lateral position, Elderly patients

INTRODUCTION

Spinal anesthesia is one of the most common methods of sensory and motor blockade used worldwide, to provide regional anesthesia for lower limbs and infraumbilical surgeries.[1]Though spinal anesthesia is extremely popular and known for its benefits like decreased mortality and morbidity, early ambulation and discharge from hospital and decrease in the thromboembolic events, it comes with its own set of complications.[2] Some of the most common side effects are hypotension and bradycardia that occur due to the sympathetic blockade.[3]

The number of elderly patients presenting for surgery has increased exponentially in recent years and neuraxial anesthesia is recommended as a well accepted option to minimise the perioperative side effects in geriatric patients. Spinal anaesthesia can be induced with the patient in sitting, lateral decubitus, or prone position and each one has its advantages and disadvantages[4] .

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In elderly patients, spinal anaesthesia may be technically difficult due to age-related degenerative anatomical changes, and they are also more sensitive to the effect of local anaesthetic drug due to changes in intrinsic neuronal sensitivity.

The sitting position appears to be optimal for spinal anaesthesia as identification of landmark, particularly midline, is much easier. However, maintaining the sitting position is often difficult for these patients. On the other hand, lateral position is generally easy to maintain for the elderly, however, the identification of anatomical landmark is also difficult. Sympathectomy caused by spinal anaesthesia along with intensified peripheral blood pooling due to gravity, especially in the sitting position often results in significant hypotension.[5] Compared to the sitting position, the lateral position may cause less hypotension.[6]

In spite of increasing use of spinal anaesthesia, the patient's position has not been standardised and very few studies have been published which studied the influence of the positions on haemodynamic stability and block characteristics (sensory and motor) in elderly patients.

So, with this background, we designed this study to compare the effect of sitting and lateral positions for spinal anaesthesia in the elderly patients.

AIMS

Comparison of sitting versus lateral position for induction of spinal anaesthesia in elderly patients.

OBJECTIVES

- To assess the onset and duration of sensory and motor blockade.
- To study changes in hemodynamic variables.
- To study the complications if any.

MATERIALS AND METHOD

This is a prospective, randomised, single blinded comparative study, conducted in the Department of Anaesthesiology, Chirayu Medical College & Hospital, Bhopal M.P over a period of one year from 1st September 2021 to 31st August 2022.

After obtaining approval from Instituional Ethics Committee, 110 patients of age group more than 60 years undergoing infraumblical surgeries under spinal anaesthesia were included in the study. Patients were fully informed by investigator in their own language about the aims and objectives of the study and the anaesthetic procedure. A written informed consent was taken from all the participants.

Inclusion criteria

- Patient undergoing infraumblical surgeries
- Age 60 years and above
- ASA grade I & II

Exclusion criteria

- Patient refusal
- Deranged coagulation profile
- Patient with raised ICT
- Patient with severe anemia
- Patient with brain tumors
- Patient with meningitis
- Local infection at site of injection

110 patients who met the inclusion criteria were randomised into 2 study groups A and B using closed envelope method.

- Group A: Sitting position (n = 55)
- Group B: Lateral position (n = 55)

On arrival in the operation theatre, standard monitors were attached and baseline vitals were noted. Subarachnoid Block (SAB) was performed using 25G Quinke's needle at the level of L3-L4 intervertebral space in sitting position or lateral position depending on the group and patients were induced using Bupivacaine heavy (0.5%). Motor blockade was assessed using Modified Bromage Scale and onset of motor block was achieved with modified bromage score -1.

Score	Motor assessment
0	Full extension of knees and feet.
1	Just able to move knees and feet.
2	Able to move feet only.
3	Inability to move feet and knees.

For level of sensory block pinprick was used every 5 minutes. The onset of sensory blockage was achieved with loss of pinprick at the highest level (on the side of surgery in case of unilateral surgeries).

The patient's comfort during spinal anaesthesia was assessed using scoring scale 0 to 2, stating levels of comfort

Score	Level of Comfort
0	Not comfortable
1	Comfortable
2	Very comfortable

Intra operatively, vital parameters were recorded at 5 minutes and then 10 minutes subsequently.

Statistical Analysis

The collected data were compiled in a Microsoft Excel sheet and subsequently statistically analysed. Descriptive and inferential statistical analyses were carried out in the present study. Results on continuous measurements were presented on Mean ± SD (Min.-Max.) and categorical measurements were presented in Number (%). The statistical software SPSS version 20 and Medcalc 19.5 were used for the appropriate statistical analysis to check statistical differences between the two groups and considered statistically significant ($p<0.05$).

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RESULT

Table 1: Demographic comparison between the two groups

	Group-A (n=55)	Group-B (n=55)	p-value
	Mean ± SD	Mean ± SD	
Age (yr.)	67.29 ±5.5	67.36±3.91	0.5752
Height (cm)	164.04 ±5.9	163.36±5.99	0.6515
Weight (kg)	67.55 ±6.84	67.65±7.48	0.6741
BMI (kg/m2)	25.07 ±3.3	25.37±3.7	0.8891
*Significant (p-value < 0.05)			

Both the groups were statistically comparable with respect to age, height, weight and BMI.

Table 2: Comparison of sex distribution between the two groups

Sex	Group					p-value
	Group-A		Group-B		Total	
	No.	%	No.	%		
Female	42	76.4	33	60.0	75 (68.2%)	0.0667
Male	13	23.6	22	40.0	35 (31.8%)	
Total	55	100	55	100	110	
*Significant (p-value < 0.05)						

The gender distribution was comparable statistically among both groups (p value-0.0667).

Table 3: Comparison between the two groups according to systolic blood pressure

	Group-A (n=55)	Group-B (n=55)	p-value
	Mean ± SD	Mean ± SD	
SBP-Pre-Op	127.2 ±14.08	136.4 ±12.34	0.0004
SBP-5	119.2 ±14.87	127.2 ±14.7	0.0054
SBP-10	123 ±15.74	132.4 ±8.79	0.0002
SBP-20	124.8 ±8.13	130 ±11.92	0.0087
SBP-30	128.8 ±3.02	120.4 ±13.71	<0.0001
SBP-40	124 ±13.19	122.4 ±14.39	0.5446
SBP-50	113.6 ±12.07	128 ±14.56	<0.0001
SBP-60	126.2 ±9.94	130 ±5.99	0.0168
*Significant (p-value < 0.05)			

Mean systolic blood pressure (SBP) was higher in group-B as compared to group-A, at all time interval except at 30mins and 40mins. At time interval 30min SBP in group A was significantly higher than group B. At 40min interval SBP was comparable with no statistical significance (p>0.05).

Table 4: Comparison between the two groups according to Diastolic blood pressure

	Group-A (n=55)	Group-B (n=55)	p-value
	Mean ± SD	Mean ± SD	
DBP-Pre-Op	79.6 ±9.06	83.2 ±1.61	0.0045
DBP-5	74.4 ±5.33	80.8 ±2.74	<0.0001
DBP-10	77.6 ±5.48	81.4 ±5.01	0.0002
DBP-20	77.2 ±4.75	84.4 ±4.84	<0.0001
DBP-30	79.6 ±4.84	84.8 ±3.51	<0.0001
DBP-40	76.2 ±8.76	76 ±4.42	0.8801
DBP-50	71.4 ±6.8	78 ±5.67	<0.0001
DBP-60	76.6 ±6.18	76.4 ±3.23	0.8319
*Significant (p-value < 0.05)			

Mean diastolic blood pressure was higher in Group-B as compared Group-A, at all-time interval except at 40 min and 60 min where DBP was higher in group A but the difference was statistically insignificant.

Table 5: Comparison between highest level of sensory block at dermatomal level between the two groups

Highest level of sensory block at dermatomal level	Group					p-value
	Group- A		Group-B			
	No.	%	No.	%	Total	
T8	11	20.0	11	20.0	22 (20.0%)	0.0532
T10	22	40.0	33	60.0	55 (50.0%)	

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T12	22	40.0	11	20.0	33 (30.0%)	
Total	55	100	55	100	110	
***Significant (p-value < 0.05)**						

Highest level of sensory block was achieved at T10 and T12 (40% each)**,** followed by T8 (20%) in group A while in group-B, highest was at T10 (60%) followed by T8 and T12 (20% each).

Table 6: Comparison between the two groups according to onset and duration of sensory block

	Group-A (n=55)	**Group-B (n=55)**	**p-value**
	Mean ± SD	**Mean ± SD**	
Onset of sensory block at dermatomal level (min)	6.2 ±1.18	7.4 ±1.03	<0.0001
Duration of sensory block (min)	70.8 ±10.02	122.8 ±2.74	<0.0001
***Significant (p-value < 0.05)**			

In all parameters of sensory block higher time values were observed in group B with statistically significant difference (p <0.0001).

Table 7: Comparison between the two groups according to onset and duration of motor block

	Group-A (n=55)	**Group-B (n=55)**	**p-value**
	Mean ± SD	**Mean ± SD**	
Time to modified Bromage 1(Onset time (min))	5±0.64	6±1.24	<0.0001
Time to Modified Bromage 3 of motor block (min)	8.8 ±0.99	9.2 ±0.99	0.0362
Duration of motor block in min	116.5 ±3.25	122.6 ±2.6	<0.0001
***Significant (p-value < 0.05)**			

Higher mean values of modified bromage1 and 3 with duration of motor block in min was observed in Group-B whereas in Group-A mean, lower value of modified bromage1 and 3 of motor block was observed.

Table 8: Comparison of Level of Comfort between the two groups among Patient

Patient	**Group**					**p-value**
	Group- A		**Group-B**			
	No.	**%**	**No.**	**%**	**Total**	
Not Comfortable	2	3.6	2	3.6	4 (3.6%)	0.0004
Less Comfortable	22	40.0	5	9.1	27 (24.5%)	
Very Comfortable	31	56.4	48	87.3	79 (71.8%)	
Total	55	100	55	100	110	
***Significant (p-value < 0.05)**						

In group B better comfort level was seen in the patients than group A.

DISCUSSION

In our study, it was observed that both the groups were similar with respect to age, gender, height, weight and BMI and there was no statistically significant difference in their mean values.

In our study, there was initially significant higher heart rate in Group-B, followed by mean heart rate was proportionally lower (p<0.001) in Group-B and further was comparable at 60 min. to group-A (p>0.001). Similarly, Mean SBP was higher in Group-B as compared Group-A, Mean diastolic blood pressure was higher proportionally in Group-B as compared Group-A, at all-time interval. These findings shows hypotension occurs in sitting position and these observations were fully correlated with findings reported by **Shahzad and Afshan**[7] who reported similar findings. **Obasuyi et al**[8] in their study concluded that the changes in hemodynamic variables were significantly lower in the lateral position than sitting position in patients undergoing spinal anesthesia. **Bhatt et al.**[9] also observed concordant findings.

In our study, we found that the onset of anesthesia was relatively faster in lateral group and they achieved higher sensory level at 5 minutes and at 10th minute and onward as well. Maximum sensory level achieved was T10 in both groups. However, these differences were statistically not significant (0.0532). **Laithangbam et al.**[10] reported similar findings. **Shahzad and Afshan**[7] observed that the onset of sensory block in the sitting group was 4.5 minutes compared with 5.4 minutes in the lateral group (p<0.006). Since we have used hyperbaric bupivacaine, it is more likely that the drug settled down more quickly in sitting position than in lateral position. Hence, we got faster onset of anaesthesia and higher sensory level in lateral position group. **Obasuyi et al.**[8] in their study concluded that the changes in hemodynamic variables were significantly lower in the group in lateral versus sitting position in

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patients undergoing spinal anesthesia with bupivacaine for vascular surgery of the lower limb.

In our study, among motor block comparison, mean Onset time, mean highest level of motor block, mean time from injection to regression in min for motor block and mean duration of motor block were observed 6 ±1.24 min, 9.2 ±0.99 min, 116.5 ±3.25 min, 118.4 ±4.31 min, in Group-A, while Group-B these were 5 ±0.64, 8.8 ±0.99 min, 122.6 ±2.6 min, and 123.6 ±3.7 min. respectively. Higher mean values of onset time, mean time from injection to regression in min for motor block were observed in Group-B whereas in Group-A mean, lower value of highest level of motor block was observed. In all parameters of motor block statistically significant difference were observed.

Partially contradictory findings were observed by **Shahzad and Afshan**[7] they observed that there was no difference between the groups for maximum density of motor block and mean time to achieve this. Similar to our study, **Laithangbam et al**[10] Reported higher block in lateral position, which is in full accordance to our study.

In our study, we found that there was a significant difference between the two positions with respect to the patient comfort score. Level of Comfort between the two groups, in both groups no one was faced "not-comfortable". In Group-B, patients as well as doctor, all were "very-comfortable", whereas in Group-A, 40% was not comfortable and 60% was very-comfortable. Statistically highly significant difference was observed between two groups. (P-value < 0.0001). Higher comfortable level was observed in lateral position for both the patient and doctor. **Fredman et al.**[11] found that there was no significant difference between sitting and lateral position in terms of patient comfort. Concordant to our study, **Shahzad and Afshan**[7] and **Bhatti et al**[9] found that patients were more comfortable in lateral position than in sitting position. This finding was in conformity with our findings. Among doctors, majority were very comfortable in sitting position as compared to group B.

CONCLUSION

The present study indicates that Induction position for spinal anesthesia does not greatly affect the hemodynamic parameters and block characteristics. However, lateral position appears to be more comfortable for elderly patients in comparison to sitting position undergoing spinal anaesthesia.

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