January 2013

Induction position for spinal anaesthesia: sitting versus lateral position

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ORIGINAL ARTICLE

Induction position for spinal anaesthesia: Sitting versus lateral position

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Abstract

Objective: To compare the effect of induction position on block characteristics (sensory and motor nerves) and haemodynamic stability in elderly patients with isobaric bupivacaine. Patient comfort was also looked at.

Methods: The randomized single blinded study was conducted at the Aga Khan University Hospital, Karachi, from September 2007 to August 2008. A total of 70 patients aged >60 years of both genders were included. Spinal anaesthesia was performed either in sitting or lateral position according to random allocation. Assessments of sensory, motor block and heart rate, systolic and diastolic blood pressure were recorded for 20 minutes. SPSS 16 was used for statistical analysis.

Results: There was no significant difference for haemodynamic variables heart rate, systolic and diastolic blood pressure. The onset of anaesthesia was faster in the sitting group (4.5 minutes vs 5.4 minutes). The motor block characteristics were similar in both the groups. The majority of patients who reported 'very comfortable' for induction position belonged to the lateral group.

Conclusion: Both sitting and lateral positions have similar effects on sensory and motor blockade and haemodynamic stability. However, patients generally found lateral position very comfortable.

Keywords: Spinal anaesthesia, Lateral decubitus position, Induction position, Isobaric bupivacaine. (JPMA 63: 11; 2013)

Introduction

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 lower limb and urological surgeries.[1,2] Spinal anaesthesia can be initiated with the patient in either the sitting or the lateral position, and each position has its advantages and disadvantages.[3]

In elderly patients, spinal anaesthesia may be technically difficult due to age-related degenerative anatomical changes. The sitting position appears to be optimal for the placement of spinal anaesthesia as identification of landmark, particularly midline, is much easier. However, maintaining the sitting position is often difficult for pre-medicated patients. On the other hand, lateral position is generally considered easy to maintain for the elderly pre-medicated patients. However, the identification of anatomical landmark is difficult. The medical sympathectomy following spinal anaesthesia with enhanced gravity-induced peripheral blood pooling, especially in the sitting position often results in significant hypotension.[1] Compared to the sitting position, the lateral position may cause less hypotension.[2]

In spite of increasing use of spinal anaesthesia, the induction position (position for initiating spinal anaesthesia) has not been standardised. In current practice, the patient's position during the initiation of spinal anaesthesia is at the discretion of the anaesthetist. In elderly patients, influence of the positions on haemodynamic stability and block character (sensory and motor nerve) has not been studied recently. This study was designed to compare haemodynamic effects and block characteristics associated with sitting and lateral positions for initiating spinal anaesthesia in the elderly. Patient satisfaction was also looked at.

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Patients and Methods

The study was conducted after approval from the institutional ethical review committee at the Aga Khan University Hospital, Karachi, from September 2007 to August 2008. It included 70 American Society of Anesthesiologists (ASA) I, II and III patients of both genders of age more than 60 years undergoing spinal anaesthesia for lower abdomen, pelvic and lower limb surgery. Consent refusal, patient with weight more than 85kg, height more than 175cm or less than 150cm and those with the contraindication of regional anaesthesia were excluded from the study. Informed written consent was obtained from all patients.

For sample size determination, the ranges of time of highest sensory block (T10) in each group were considered as 5.5 and 6, and standard deviations (Range/4) came out to be 1.4 and 1.5 respectively. According to calculations, 35 patients in each group achieved 80% power to detect a mean difference of 1 with

5% level of significance.

For this randomised single blinded study, patients were randomly allocated to one of the two groups by picking sealed envelopes. Patient and primary investigator were not blinded, and data was collected by a trained independent observer to make the study single blinded. Patients were routinely pre-medicated with oral midazolam 7.5mg and preloaded with 7-8ml of crystalloid solution. Baseline heart rate and blood pressure (BP) were recorded after which the data collector was asked to leave the operating room. Spinal anaesthesia was performed with the patient in sitting or lateral position at L3-L4 or L4-L5 level via midline approach, using a 25-gauge pencil-point spinal needle with introducer. In the sitting group, patients were sitting with feet resting on a stool and back facing towards the anaesthetist, while in the lateral group, they were lying on the operating table with knee and hip joint in flexion position during the initiation of spinal anaesthesia.

The Bupivacaine 12.5mg of 0.5% isobaric was injected with bevel of needle facing upward at a speed of 0.5ml/sec. Patients were placed in the supine position immediately after withdrawing the spinal needle and the data collector was called again.

Every two minutes after the injection of spinal anaesthesia until 20 minutes, assessments were made for height of sensory and density of motor nerve block and cardiovascular parameters, including heart rate, systolic and diastolic blood pressures. Sensory level assessment was done with ice and motor block assessment with 0-3 point scale.[4] [0 (none) full flexion of knees and feet; 1 (partial) just able to move knees and feet; 2 (almost complete) able to move feet only; 3 (complete) unable to move feet or knees.]

The cardiovascular side effect, e.g. decrease in mean arterial blood pressure >25% of the baseline levels, was treated by incremental doses of intravenous ephedrine 5mg or phenylephrine 100µg, while decrease in the heart rate below 45 beats per minute was treated by 1mg atropine.

The primary outcome was the sensory block level during the first 20 minutes after the spinal anaesthesia. Other outcome included motor block score, bradycardia and hypotension, and vasopressor requirements. After spinal anaesthesia and prior to the start of surgery, patients were asked about their satisfaction for overall comfort level for position (sitting or lateral) during spinal anaesthesia in terms of three options: not comfortable, comfortable, and very comfortable.

Data was analysed using SPSS 16. Mean ± standard deviation was computed for age, weight, height. Time to achieve density of motor block and height of sensory block was compared using independent samples t- test. Chi square test was applied to compare patient comfort and cardiovascular side effects. Repeated measures Analysis of Variance (ANOVA) was used to compare effects like heart rate, systolic and diastolic blood pressures of the two groups. P value of 0.05 or less was considered statistically significant.

Results

Demographic characteristics of patients in both groups

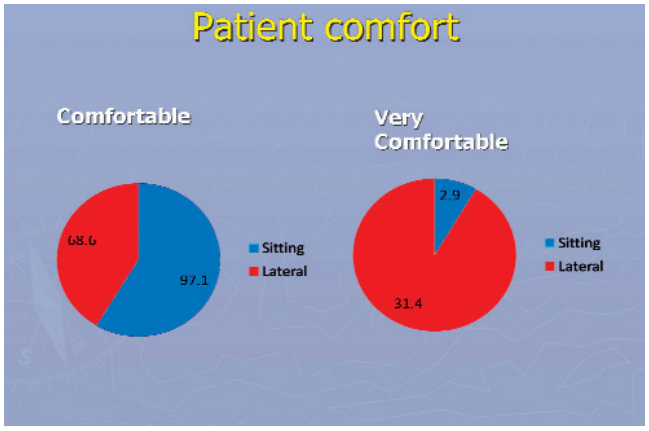


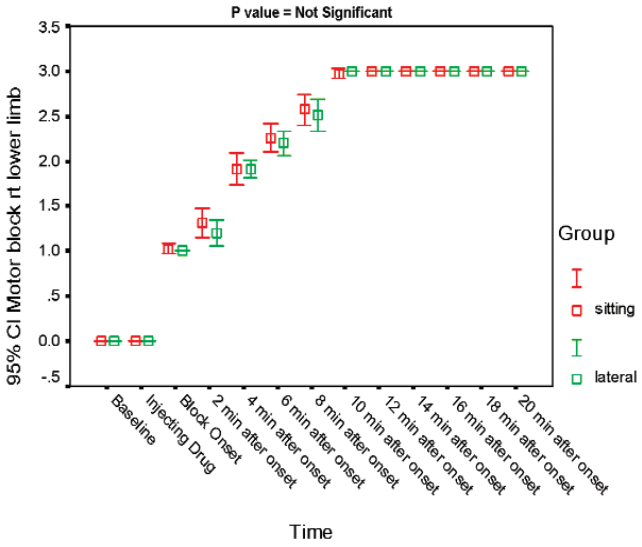
Figure: Comparison of comfort level with positioning between the two groups.

Table-1: Demographics.

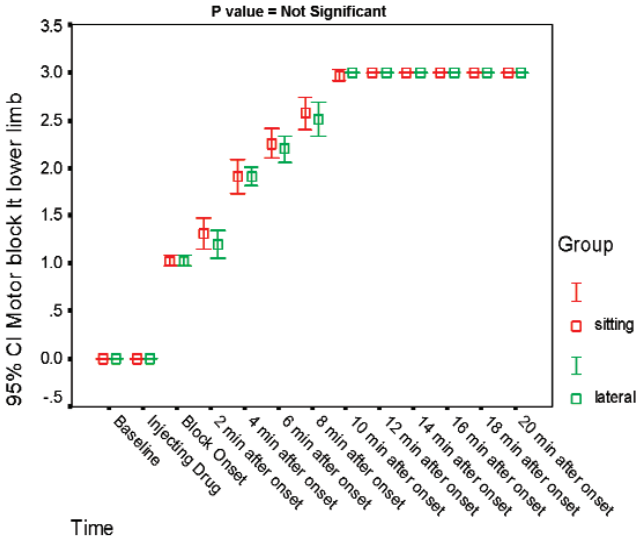
Variable	Group	Mean	Standard Deviation	p-value
Age of the patient (years)	Sitting	66.94	4.99	0.012*
	Lateral	70.74	7.18	
Weight of patient (kg)	Sitting	69.02	9.63	0.659
	Lateral	67.97	10.33	
Height of patient (cm)	Sitting	164.80	7.82	0.453
	Lateral	166.14	7.04	
Body Mass Index	Sitting	25.43	3.29	0.236
	Lateral	24.54	2.94	

Table-2: Comparison of sensory block height achieved.

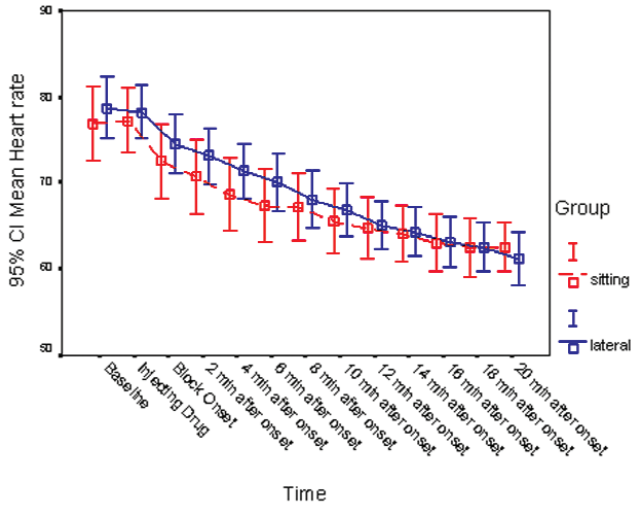
Height of sensory block	Group A (Sitting)	B (Lateral)	p-value
T8	13 (37.1%)	22 (62.9%)	
T7	13 (37.1%)	6 (17.1%)	
T6	3 (8.6%)	5 (14.3%)	0.064
T5	3 (8.6%)	2 (5.7%)	
T4	3 (8.6%)	0 (0.0%)	
Total	35	35	



Graph-1: Comparison of mean motor block in the right lower limb between the two groups at different time intervals.

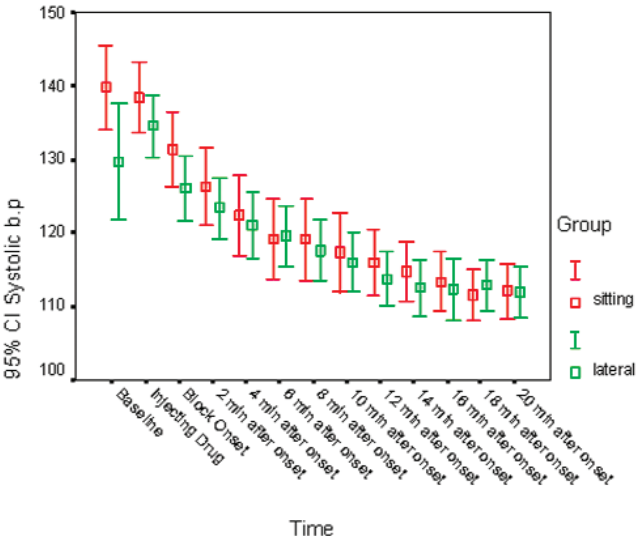


Graph-2: Comparison of mean motor block in the left lower limb between the two groups at different time intervals.



Repeated measure ANOVA applied to compare mean heart rate between groups (p=0.52)

Graph-3: Comparison of mean heart rate between the two groups at different time intervals.

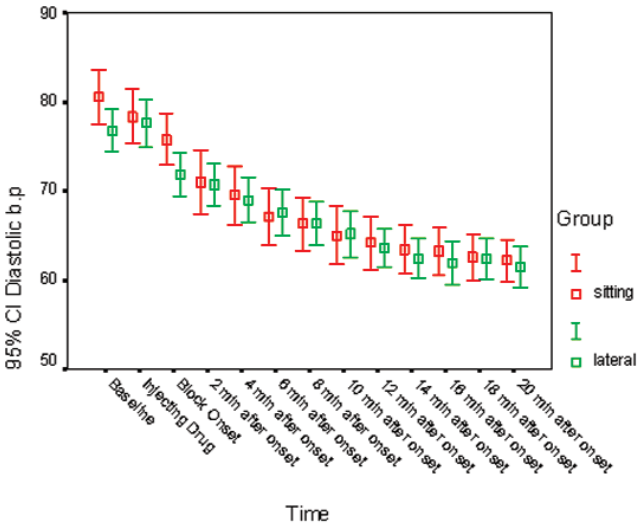


Repeated measure ANOVA applied to compare mean heart rate between groups (p=0.36).

Graph-4: Comparison of mean systolic blood pressure between the two groups at different time intervals.

were matched. Only mean age was statistically significant (p <0.012) (Table-1). Other variables including ASA level, type of surgery and level of needle insertion were also matched.

The time for onset of sensory block in the sitting group



Graph-5: Comparison of mean diastolic blood pressure between the two groups at different time intervals.

was 4.5 minutes compared with 5.4 minutes in the lateral group (p <0.006). The mean time to achieve T10 level was 8.17±1.5 minutes in the sitting group and 7.71±1.3 minutes in the lateral group (p <0.175).

In the sitting group, 3 (8.6%) patients had highest sensory block up to T4 level, while in the lateral group, 2 (5.7%) achieved sensory block up to T5 level (Table-2). There was no difference between the groups for maximum density of motor block (3/3) and mean time to achieve this (Graph 1 and 2).

No significant difference was observed between the two groups for heart rate at any stage from the baseline until 20 minutes after the onset of spinal anaesthesia (Graph 3). There was no statistically significant difference in the mean systolic blood pressure between the two groups (Graph 4). The groups were also well matched for diastolic blood pressure except at the baseline and the onset of spinal anaesthesia (Graph 5).

In the sitting group, 6 (17%) patients and in the lateral, four (11%) had hypotensive episode requiring vasopressors at one or more times (P <0.734). None of the patients in the lateral group had bradycardia, while 3 (8.6%) in the sitting group had one episode of bradycardia which required treatment with atropine. This difference was statistically insignificant.

As regards the induction positions for the initiation of spinal anaesthesia, more patients in the lateral group reported to be in the 'comfortable category' than in the sitting group (Figure).

Discussion

There is some debate whether the induction position, sitting or lateral, during spinal anaesthesia may affect the spread of isobaric local anaesthetic drugs and eventually influence the characteristics of the nerve blockade (sympathetic, sensory and motor).[5,6]

The role of induction position during spinal anaesthesia using hyperbaric bupivacaine is proven to some extent. However, its effects with isobaric bupivacaine in elderly patients have not been sufficiently studied. There is a definite paucity of literature with comparative study of spinal anaesthesia in this age group, addressing the issue of patient's position for the initiation of spinal anaesthesia with isobaric bupivacaine.

In our study, demographic characteristics of both the groups were comparable except that the mean age in the lateral group was more than the sitting group patients. However, it did not seem to have any impact on the overall outcome considering the other well-matched parametres including body mass index (BMI) and ASA status.

In our study, the onset of spinal anaesthesia was faster in the sitting than in the lateral position (4.5 vs 5.4 minutes). Although this difference was statistically significant, but apparently would not be of much significance clinically as time to achieve T10 level, which matters the most, was comparable (8.17 vs. 7.71 minutes). The finding of our study was contrary to previous literature where mean sensory block of T10 was achieved at 10 minutes in both the groups.[1] This increased time to achieve the desired level may be explained by lesser dose of local anaesthetic drugs used in the study compared to our dosages.

The sympathetic blockade usually results in hypotension whether the patient is in the sitting or the lateral position. The vasovagal episode might occur with a great frequency or severity in the sitting position and additional gravity-dependent peripheral pooling may result in orthostatic hypotension in the sitting position.[7,8] In our study, 3 patients in the sitting position had sensory block level up to T4 (more than the desired level of T10), while none of the patients had T4 in the lateral position. This finding is consistent with the previous study which reported higher spread of isobaric bupivacaine up to T4 level in the sitting position compared with the lateral position.[9] In our study, motor nerve blockade did not seem to change with position as reported earlier.[10,11]

In terms of cardiovascular effects, our study showed similar trends in both the groups. However, significant differences in the mean systolic/diastolic blood pressure

between the two groups were found at the baseline level. This increased baseline BP could be due to individual high level of anxiety upon arrival in the operating room as the groups were very well matched at other study timings. Both the study groups were also very well matched for episodes of bradycardia/hypotension requiring treatment. These findings were almost similar to what has been reported previously.[2]

In this study, more patients in the lateral position reported 'very comfortable' compared to the sitting group. This is different from the previously reported finding where the patient comfort level was almost similar between the two groups.[1] In our study, all patients received pre-medication with midazolam. Thus, the patients might have felt more comfortable in the lateral position than sitting up in bed. The earlier study did not comment about the effect of pre-medication with the position.

Our study had its strengths and limitations. It was the first study addressing the position effect of elderly patients during spinal anaesthesia with isobaric bupivacaine in Pakistani population, and covered several bases like sensory and motor blockade as well as haemodynamic stability. However, due to the small sample size, some of the findings remain questionable. We also did not look into the anaesthetist's preference for the induction position. Although it is perceived that spinal anaesthesia is easier to perform in the sitting position, but there is no published evidence to indicate this.

Conclusion

Both sitting and lateral positions have similar effects on sensory and motor blockade and haemodynamic stability. However, patients found the lateral position most comfortable.

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