Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

ORIGINAL RESEARCH

Comparison of the Effects of Left Lateral Versus Sitting Position During Induction of Spinal Aneshtesia in Pregnant Women Undergoing Elective Caesarean Section

Shraddha Dhakulkar[1], Vikas Choudhary[2], V Sirsat[3], S Chauhan[4]

[1]Senior Resident, Department of Anesthesia, IGGMC, Nagpur, India.
[2]Assistant Professor, Department of Anesthesia, IGGMC, Nagpur, India.
[3]Associate Professor, Department of Anesthesiology, VDGMC, Latur, India.
[4]HOD, Department of anesthesiology, VDGMC, Latur, India.

Received Date: 17/11/2022 Acceptance Date: 19/02/2023

ABSTRACT

Introduction: Spinal anesthesia is the method of choice for the caesarean section and hypotension is a common complication of this method. Lateral and sitting positions are commonly used for performing subarachnoid block in parturients. The present study was undertaken to compare the effect of left lateral versus sitting position on the hemodynamic changes and block characteristics during induction of spinal anaesthesia in pregnant women undergoing caesarean section. Method: Total 100 pregnant women, aged 20-45 years belonging to ASA Grade I and II were enrolled and divided into two groups of 50 patients in each group. Parameters studied were hemodynamic changes, block characteristics, laboratory parameters and then finally comfort level. Results: During the entire observation period after induction of spinal anaesthesia, there was statistically significant difference between the mean systolic and mean artery blood pressure of patients in minutes 30, 45 and 60 whereas significant difference in mean diastolic blood pressure in minutes 30 in sitting and lateral position groups ($p<0.01$). There was statistically significant difference between the two groups in terms of sensory level achieved at 1,3,5,10,20,45 min intervals ($p<0.01$). Patients in lateral group achieved higher motor level after 3 minutes, this was significant, ($P=0.047$) and also higher motor level achieved after 5 minutes but difference was insignificant, ($P=0.242$). However, no difference found to achieve higher motor level after 45 minutes. In both the groups most of the patients felt comfortable but lateral position appears to be more comfortable for pregnant patients, ($p=0.01$). Conclusion: Induction position for spinal anaesthesia does not affect hemodynamic parameters but it affects the block characteristics.

Keywords: Spinal anesthesia; Caesarean section; Hypotension; Lateral; Sitting positions; Hemodynamic; Sensory; Motor

Corresponding Author: Dr. Shraddha Dhakulkar, Senior Resident, Department of Anesthesia, IGGMC Nagpur, India.
Email: vinita.tiriya@gmail.com

INTRODUCTION

The number of pregnant patients undergoing caesarean section has increased in recent years. Caesarean section is undertaken to improve maternal or fetal outcome, or to reduce anticipated complications from spontaneous labour and vaginal delivery. Spinal anesthesia is the preferred anesthestic technique depending upon the condition of patient. This technique is

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

particularly popular because it is fast, easy to perform, has rapid onset with provision of dense neural blockade and provides excellent intraoperative analgesia [1]. But most common complication associated with this method is hypotension [2]. It may be due in part to cephalad spread of local anaesthetic in the subarachnoid space and also aortocaval compression by the gravid uterus. Both these factors influenced by the parturient posture during and immediately after subarachnoid injection [3].

Spinal anaesthesia is one of the modalities of regional anaesthesia techniques, it may be conducted with the parturient in the sitting or lateral position [4]. Different positions also changed compression of gravid uterus on inferior vena cava that can influence maternal blood pressure and fetal condition [5]. Choosing proper position during induction of anesthesia is necessary for parturients and anesthetist to prevent potential incomplete anesthesia and ischemia and hypoxia injury of mother and fetus [6]. The sitting position appears to be optimal for the placement of spinal anaesthesia as identification of landmarks, particularly in the midline, is much easier. However, maintaining the sitting position is often difficult and uncomfortable for pregnant patients. Lateral position is generally considered comfortable and easy to maintain for the pregnant patients. But the identification of anatomical landmarks is difficult [7].

The medical sympathectomy following spinal anaesthesia with enhanced gravity-induced peripheral blood pooling, especially in the sitting position often results in significant hypotension. Compared to the sitting position, the lateral position may cause less hypotension. In parturient this position relieves IVC obstruction that improves venous return and cardiac output, uteroplacental blood flow and causes lesser engorgement of epidural plexus [7]. In literature, studies of administration of spinal anesthesia in different maternal positions have shown variable results on hemodynamic parameters. Hence the present study was undertaken to compare the effects of left lateral and sitting positions during induction of spinal anaesthesia for elective lower segment caesarean section, for their effects on hemodynamic stability and block characteristics.

MATERIALS AND METHOD

This open randomized comparative study was conducted after obtaining approval from Institutional Ethics Committee during a period of 24 months starting from the date of ethics committee approval. Total 100 pregnant patients with age 20-45 years belonging to ASA Grade I and II, patient near full term undergoing spinal anaesthesia scheduled for elective caesarean section were included. Patients with ASA grade 3 and 4, patient's refusal to give consent, hypersensitivity to Inj. Bupivacaine, patients with contraindication to spinal anaesthesia (INR>1.3, use of anticoagulant drugs), infection at the site of injection, pre-existing neurological deficit and patient with severe hypovolemia were excluded from the study.

Data were collected regarding the sociodemographic profile, using a questionnaire by face-to-face interview method. Both open and close-ended questions were asked to the patients. Each patient was visited a day prior to surgery in wards. A detailed history and systemic examination were carried out. Spine was examined. Routine investigations like complete blood count, electrocardiogram, chest radiograph was noted. The procedure to be done was explained to the patient and written informed consent was obtained. On the day of surgery, NBM status was confirmed. Investigations and informed consent were rechecked. General anaesthesia trolley, spinal anaesthesia trolley, resuscitation drugs were prepared and checked. In the operation theatre monitors were attached to the patient - cardio scope, pulse oximeter, non-invasive blood pressure monitor (NIBP). Baseline heart rate, SPO2, blood pressure (B.P.) was recorded. A large bore IV line was taken on the dorsum of non-dominant hand. All patients were preloaded with 10ml/kg of i.v. Lactated Ringer's solution. Patient was given

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

position for spinal anaesthesia. The position of spinal anaesthesia either sitting or lateral was decided by the anaesthesia in charge of the theatre based on randomization chart table.
Sitting position: Patients was sitting with feet stretched in the axis of the operation table and back facing towards the anaesthetist. For lateral position, patients were lying in left lateral position on the operating table with the knees and hips in flexion. Under all aseptic precautions, spinal anaesthesia was performed with the patient in sitting or lateral position at L3-L4 level via mid-line approach using a 25-gauge Quincke's spinal needle. 0.5% Hyperbaric Bupivacaine was injected with the bevel of the needle facing cephalad after clear and free flow of CSF and after confirming negative aspiration for blood. Inj. Bupivacaine was given as 1.8-2 cc. Immediately after withdrawing the spinal needle, patient was placed in supine position. Every 2 minutes after the injection of drug for first 10 minutes then every 5 minutes for next 30 minutes then every 15 min till 1 hour's assessments were made for systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean blood pressure (MAP). Sensory level assessment was done with pin prick in midline. Motor assessment was done with 0 to 3 modified Bromage scale (0 - no motor block; 1 - Inability to raise extended leg; able to move knees and feet; 2 - Inability to raise extended leg and to move knees and able to move feet and 3 - complete block of motor limb).
A decrease in mean arterial blood pressure of >20% of the baseline level was treated with fluid boluses followed by incremental doses of intravenous ephedrine 6mg. A decrease in the heart rate >20% of the baseline level was treated with 0.6mg atropine intravenously. At the end of surgery, patients were asked about their satisfaction for overall comfort level for position during spinal anaesthesia in terms of three points as: - 0 - Not comfortable; 1 – Comfortable and 2 - Very comfortable

STATISTICAL ANALYSIS

Continuous variables (Demographic and haemodynamic parameters) were presented as Mean ±SD. Categorical variables were expressed in frequency and percentages. Categorical variables were compared by performing chi2-square. Comparison of mean of haemodynamic parameters between Left lateral and sitting position by performing independent t-test. For small numbers, Fisher exact was used. $p<0.05$ was considered as statistical significance. Statistical software STATA version 14.0 was used for data analysis.

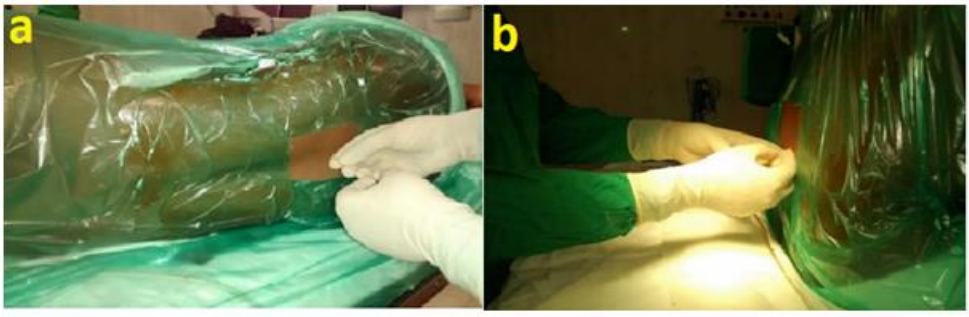

Figure 1: Induction of spinal anaesthesia- a) in lateral position and b) in sitting position

OBSERVATIONS AND RESULTS

A total of 100 pregnant patients were enrolled in the study and equally divided into left lateral and sitting position group. In lateral position, most of the patients (40; 80%) were primi followed by 10 (20%) were multi para whereas in sitting position, 41 (82%) patients were primi followed by 9(18%) were multi para. Both the groups were comparable and found no statistically significant difference in regard to age, height, weight and pallor while baseline

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

pulse rate and SPO2 shown statistically significant difference between the two groups as shown in table 1.

Table 1: Comparison of baseline characteristics of patients between Left lateral and sitting position

Parameters	Left Lateral	Sitting position	P value
Age in years	22.86 ± 2.88	22.28 ± 2.22	0.2629
Height in cm	157.76 ± 6.43	158.32 ± 9.23	0.7528
Weight in kg	61.21 ± 8.82	60.54 ± 7.95	0.4842
Pulse rate	96.96 ± 5.73	100.64 ± 7.34	0.0063 HS
SBP	128.84 ± 8.07	127.68 ± 6.86	0.4407
DBP	82.08 ± 6.19	82.16 ± 5.23	1.0000
RR	19.58 ± 0.86	19.52 ±1.07	0.7583
SPO2	98.28 ± 0.60	98.52 ± 0.54	0.0400

During the entire observation period after induction of spinal anaesthesia, there was no statistically significant difference between the mean heart rate of patients in sitting and lateral position groups. While statistically significant difference found in mean systolic and artery blood pressure of patients in minutes 30,45 and 60 after spinal anesthesia in sitting and lateral position groups ($p<0.001$). However, there was statistically significant difference between the mean diastolic blood pressure of patients in minutes 30 after spinal anesthesia in sitting and lateral position groups ($p<0.01$), (Figure 2).

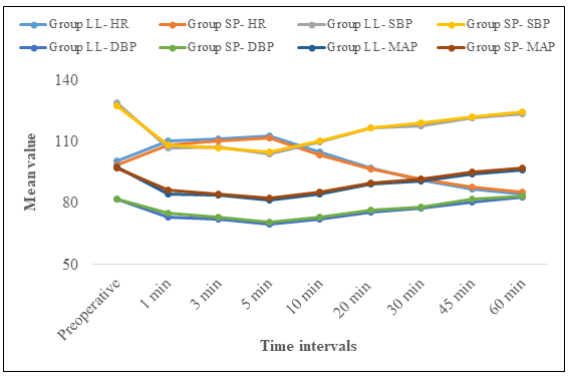

Figure 2: Comparison of haemodynamic parameters between two groups

There was statistically significant difference between the two groups in terms of sensory level achieved at 1, 3, 5, 10, 20, 45 min intervals ($p<0.01$) as shown in table 2.

Table 2: Sensory level assessment between Left lateral and Sitting position

Sensory level		Left Lateral	Sitting position	P value
At 1 min	L1	04 (8%)	11 (22%)	0.050
	T12	46 (92%)	39 (78%)	
At 3 min	T6	01 (2%)	00 (0.0%)	0.007
	T8	29 (58%)	14 (28%)	
	T10	19 (38%)	31 (62%)	
	T12	01 (2%)	02 (4%)	
At 5 min	T6	15 (30%)	08 (16%)	0.060
	T8	25 (50%)	22 (44%)	
	T10	10 (20%)	20 (40%)	
At 10 min	T4	04 (8%)	00 (0.0%)	0.086
	T6	36 (72%)	33 (66%)	

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

	T7	09 (18%)	16 (32%)	
	T8	01 (2%)	01 (2%)	
At 20 min	T4	08 (16%)	02 (4%)	0.108
	T6	40 (80%)	44 (88%)	
	T7	02 (4%)	04 (85)	
At 45 min	T4	01 (2%)	00 (0.0%)	1.000
	T6	32 (64%)	32 (64%)	
	T8	17 (34%)	18 (36%)	

Patients in lateral group achieved higher motor level after 3 minutes, however this difference was statistically significant. (P-0.047) and also higher motor level achieved after 5 minutes but this difference was not statistically significant, (P-0.242). There was no difference between patients in lateral group and sitting group to achieve higher motor level after 45 minutes, (Table 3).

Table 3: Motor level assessment between Left lateral and Sitting position

Groups		**Motor level as per Bromage scale**				**P value**
		0	**1**	**2**	**3**	
At 3 minutes	Left lateral	00 (0.0%)	00 (0.0%)	05 (10%)	45 (90%)	0.047
	Sitting Position	00 (0.05)	02 (4%)	12 (24%)	36 (72%)	
At 5 minutes	Left lateral	00 (0.0%)	00 (0.0%)	00 (0.0%)	50 (100%)	0.242
	Sitting Position	00 (0.05)	00 (0.0%)	03 (6%)	47 (94%)	
At 45 minutes	Left lateral	00 (0.0%)	00 (0.0%)	00 (0.0%)	50 (100%)	Not applicable
	Sitting Position	00 (0.0%)	00 (0.0%)	00 (0.0%)	50 (100%)	

In both the groups most of the patients felt comfortable but lateral position appears to be more comfortable for pregnant patients, (p=0.01) as depicted in figure 3.

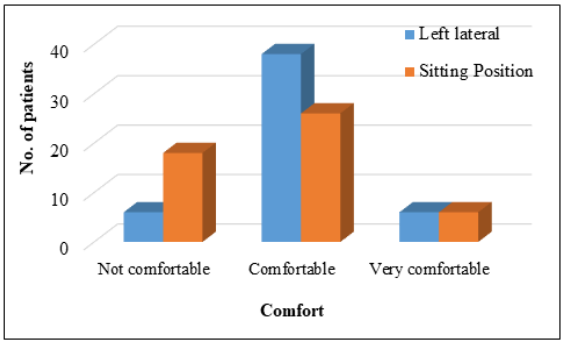

Figure 3: Distribution of study population according to presence of comfort

DISCISSION

One of the factors that interferes with the success of spinal anaesthesia is the positioning of the patient, which should allow easy identification of midline structures, contributing to the opening of the intervertebral space, producing minimal hemodynamic compromise and be comfortable for the patient and safe for the baby. Thus, the position used for spinal block placement varies among the anaesthesiologists [8].

Maternal posture may affect the spread of onset of sensory blockade by influencing the spread of the local anaesthetic drug. Thus, the present study was performed to compare the effect of left lateral versus sitting position on the hemodynamic changes, sensory and motor level during the induction of spinal anaesthesia in pregnant women undergoing caesarean section. There was no statistically significant difference between the age, height, weight and pallor in sitting and lateral position groups (p=0.26,0.75,0.48,0.27) which is comparable with

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

the study conducted by Manouchehrian N et al [9], Ramayyan Achary et al [10] and Aeron N et al [11]. 50% of patients in lateral position and 48% in sitting position had pallor presentation. There was no significant difference between airway examinations in the form of mouth opening, mallampatti grade, teeth condition and spine neck in both lateral and sitting position. There was statistically significant difference between the groups in baseline pulse rate ($p<0.01$) and SPO2 ($p<0.05$) while insignificant difference found in regard to baseline systolic and diastolic blood pressure as well as baseline respiratory rate (p-0.44)

Most of the patients (80%) in lateral position were primi and 20% were multi para whereas in sitting position 82% were primi and 18% were multi para which is similar to the study done by Obasuyi et al [2]. The explanation of this result could be related to decrease in peripheral vascular tone during pregnancy. The extent of the reduction in systemic vascular resistance in pregnancy was higher in multiparous when compared to nulliparous [12]. Hence, sympathectomy as a result of spinal anesthesia in multiparous has been associated with further spinal hypotension [13].

During the entire observation period after induction of spinal anaesthesia, there was no statistically significant difference between the mean heart rate of patients in sitting and lateral position groups. No difference in the mean heart rates both in intergroup and intragroup. The mean systolic blood pressure in minutes 30, 45 and 60 after spinal anesthesia were significantly lower in patients in the lateral position than sitting position ($p<0.01$). However, the mean diastolic in minutes 30 after spinal anesthesia were significantly lower in patients in the lateral position than in the sitting position ($p<0.01$). Mean arterial blood pressure in minutes 30, 45 and 60 after spinal anesthesia were significantly lower in patients in the sitting position than in patients in the lateral position ($p<0.01$). From the above results it can therefore be commented that induction position sitting, or lateral does affect the mean heart rate, systolic, diastolic and arterial blood pressure. These findings are in accordance with the study carried out by Mutreja P et al [8] and Kharge ND et al [14].

Patients under spinal anesthesia in the lateral position, the mean onset time of sensory block (time to reach the sensory level of T6) and the mean onset time of motor block was significantly lower ($P<0.001$) when compared to patients in the sitting position which was statistically significant ($p<0.01$). Similar findings are reported in previous studies [9, 11, 14, 15].

In both the groups most of the study subjects felt comfortable but lateral position appears to be more comfortable for pregnant patients ($p=0.01$). There was significant difference between the two groups in terms of patient comfort. These findings are correlated with the other studies [14, 16, 17]. In contrast to present study, Achary R et al [10] observed Parturients in sitting group found their positioning more comfortable (76 vs. 34%, $P < 0.001$).

LIMITATION

Mother's body mass index has possible effects on haemodynamic as higher chances of induced hypotension and other comorbid disease that affected studied variables [22], were not considered in present study. We had no access to Doppler ultrasonography or bedside echocardiography.

CONCLUSION

In conclusion, mean arterial pressure appears to be lower in left lateral position than in sitting position clinically but the difference between two group was not statistically significant. Induction position for spinal anaesthesia does not affect hemodynamic parameters but it affects the block characteristics. As far as patient comfort is considered, left lateral position appears to be more comfortable for pregnant patients.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

REFERENCES

1. Khaw KS, Kee WDN, Lee SW. Hypotension during spinal anesthesia for caesarean section: Implications, Detection, Prevention and Treatment. Fet Mat Med Rev 2006;17:1-27.
2. Obasuyi BI et al. A comparison of the haemodynamic effects of lateral and sitting positions Obstetric Anesthesia, 2013;22(2):124.
3. Rucklidge MWM et al. A comparison of the lateral, Oxford and sitting positions for performing combined spinal-epidural anaesthesia for elective Caesarean section, Anaesthesia, 2005;60(6):53.
4. Kinsella SM, Harvey NL. A comparison of the Pelvic angle using lateral tilt table or a Pelvic wedge at elective caesarian section Anaesthesia 2012; 67(12): 1327-31.
5. Inglis A, Daniel M, Mc Grady E. Maternal position during induction of spinal anaesthesia for caesarean section; A comparison of right lateral and sitting positions. Anaesthesia. 1995; 509(4):363- 365.
6. Tan ED, Gunaydin B. Comparison of maternal and neonatal effects of combined spinal epidural anaesthesia either in sitting or lateral position during elective caesarean section. Turk J Anaesthreanim. 2014; 42:23-32.
7. Hocking G, Wildsmith JAW. Intrathecal drug spread. BJA 2004; 93(4):568-578.
8. Mutreja P, Dwivedi V, Sarkar J. Comparison of the effect of induction position in spinal anaesthesia on sensory block in pregnant women undergoing elective lower segment caesarean section with hyperbaric bupivacaine. JMSCR 2019; 07 (06): 951-9.
9. Manouchehrian N, Moradi A and Torkashvand L. Comparative Study of Effect of Spinal Anesthesia in Sitting and Lateral Positions on the Onset Time of Sensory Block and Hemodynamic Condition in Cesarean Section: A Randomized Clinical Trial. Anesth Pain Med. 2021; 11(1):e111483.
10. Ramayyan Achary A, Puthenveettil N, Rajan S, Kumar L. A comparison of time to achieve T5 blockade in lateral versus sitting position during elective cesarean section under spinal anesthesia: A randomized control trial. J Obstet Anaesth Crit Care 2020;10:21-5.
11. Aeron N, Vakamudi M. A study to evaluate hemodynamic effects of lateral and sitting position during induction of spinal anesthesia for lower segment caesarean section. JMSCR.2020;8(6):1-8.
12. Clapp JF 3rd, Capeless E. Cardiovascular function before, during, and after the first and subsequent pregnancies. Am J Cardiol 1997;80:1469-73.
13. Toyama S, Kakumoto M, Morioka M, Matsuoka K, Omatsu H, Tagaito Y, et al. Perfusion index derived from a pulse oximeter can predict the incidence of hypotension during spinal anaesthesia for caesarean delivery. Br J Anaesth 2013;111:235-41.
14. Kharge ND, Mali A, Gujjar P. Comparison of haemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for elective caesarean section. Int J Res Med Sci 2017;5:851-6.
15. Bhat SA, Tali SH, Kumar NM. Sitting versus lateral position for induction of spinal anesthesia in elderly patients: a randomized controlled trial. Asian J Pharm Clin Res 2017;10(2):262-265.
16. Shahzad K, Afshan G. et al Induction position for spinal anaesthesia: sitting versus lateral position.J Pak Med Assoc. 2013 Jan; 63(1):11-5.
17. Chevuri SB, Rao J, Chandergutti V, Hussain MM, Khan BA. A Comparative Study of Effects of Sitting and Lateral Positions on Quality of Block during Induction of Spinal Anaesthesia in Patients Undergoing Cesarean Section. J Contemp Med Dent. 2015;3(1):93–4.