Original Research Article

A Comparative Study to Evaluate Hemodynamic Effects of Sitting and Lateral Position During Induction of Subarachnoid Block for Lower Segment Caesarean Section

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Abstract

Objective: To compare the effect of induction position on block characteristics (sensory and motor nerves) and haemodynamic stability in caesarian section patients with bupivacaine. A note was also made about patient comfort and satisfaction.**Methods:** The randomized single blinded study was conducted and 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 v/s 5.4 minutes). The motor block characteristics were similar in both the groups.The sensory and motor block was slightly intence in lateral position and took more time for both blocks to regress. 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: Sitting , Lateral Position ,Sensory , Motor Blockade ,Haemodynamic Stability.

Introduction

Neuraxial blockade has a wide range of clinical applications in the field of surgery, obstetrics and even pain management. The technique of spinal anaesthesia is simple and has high success rate and hence is most commonly performed in many institutions. Regional anesthesia is preferred by most anaesthesiologists for the majority of caesarean sections. Spinal anesthesia (subarachnoid block) is most popular among all of available regional anesthesia techniques because it is fast, easy to perform, has rapid onset with provision of dense neural blockade and provides excellent intraoperative analgesia. In pregnant women, greater sensitivity to local anesthetics results in higher blocks, and compounded by the effects of aortocaval compression, hypotension occurs with greater frequency and severity. Aortocaval compression(ACC) during pregnancy when parturients are supine is well recognized cause for supine hypotension syndrome.Only about 8% pregnant women in the 2nd and 3rd trimester develops hypotension in supine position when ACC is severe. Sympathetic blockade after subarachnoid block can cause severe hypotension which further compounds the uteroplacental hypoperfusion and lead to fetal academia. In literature, studies of subarachnoid block given in different maternal positions have shown variable results on hemodynamic parameters. Therefore, this study was proposed to evaluate hemodynamic parameters in sitting and left lateral positions during subarachnoid block for caesarean section[1-3].

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Materials and Methods

This is a 3 monthsinterventional randomisedcontrol and comparative study between 2 groups will be conducted by the Department of Anesthesiology, GMC, Ratlam. All caesarean cases should be selected from cases in operation theatre of M.C.H. O.T. of District Hospital Ratlam. Data of all the caesarean cases done collected and make available by the faculty members of department of Anesthesiology, GMC, Ratlam**.**

Study design

Interventional randomized control , comparative study.

Sample size

Total 150 gravidas(Total 75 cases in each of 2 groups) will be taken as subjects with written informed consent . (Sample size calculated by formula:- $N7/ (Z_\alpha + Z_\beta)^2 \times Z \times \sigma^2 + d$. [$Z_\alpha$= 95 and CI= 1.96, Z_β=80, Power= 0.84])

Study area and participants

Interventional randomisedcontrol and comparative study will be conducted by the all the investigators ofDepartment of Anesthesiology, Government Medical College, Ratlam. All data collection of this study collected and make available by the investigators of Department of Anesthesiology, GMC, Ratlam.

Data Collection

After institutional ethical committee approval, 150 gravidas undergoing caesarean section under spinal anaesthesia will be selected. A detailed history, complete physical examination and investigations will be done for all. Informed written consent will be taken for participation in study. The study population will be randomly divided into 2 groups with 75 females in each group.

Inclusion/Exclusion criteria: Inclusion criteria- a)ASA grade 1 and 2Full term pregnant female undergoing elective/emergency caesarean section under subarachnoid block, all should be willing for

being the subject of study. b) Gravidas given informed, written and valid consent.

Exclusion criteria- a) Patient's refusal for procedure. b) Patients with significant coagulopathy and other contraindications for spinal anaesthesia. c) Patients with PIH. d) Patients belonging to ASA class 3,4 and 5. e)Allergy to local anaesthetics and bupivacaine. f) Patients with significant systemic disorders. g)Intrauterine growth retardation. h)Failure to achieve desired level of spinal blockade. 8)Failure to identify L_{3-4} space.

Informed consent: Informed consent form in the accepted given format attached with this project submission format**.**Written consent was obtained from the relatives of patients after explaining them the nature and purpose of the study. They were assured that confidentiality would be strictly maintained. The option to withdraw from the study was always open

Observation Chart

Table 1:Showing Group Distribution

Groups(No. of Patients)	Study Drugs and Its Doses
Group S:75 patients	Parturients undergoing LSCS , who all given SAB In Sitting position .
Group I: 75 patients	Parturients undergoing LSCS , who all given SAB In left lateral position

Table 2:Demographic Profile Of Patients

Variables	Group S	Group L	P value
Age (years)	27.18 ±09.72	27.28 ± 10.14	0.96
weight (in kg)	61.32 ± 04.54	61.46 ± 12*42	0.38

Patients characteristics in terms of age and weight were comparable in both the group s (P>0.05).

Table 3:Comparison Of Sensory Characteristics Of Subarachnoid Block Between Two Groups

Variables		Group S Sitting	Group L lateral	P Value
Highest sensory level achieved (range)		$T_6 - T_8$	$T_6 - T_8$	
Onset of sensory block (min)	At L_1 dermatome	01.350 ± 00.400	1.4 ± 00.45	0.24
	At T_{10} dermatome	03.32 ± 01.17	03.39 ± 00.68	0.17
	At highest sensory level	10.45 ± 01.91	10.99 ± 01.69	0.13
Time to reach peak of sensory block (min)	L_1 dermatome	02.61 ± 00.84	02.7 ± 00.47	0.35
	T_{10} dermatome	04.54 ± 01.36	04.71 ± 00.93	0.45
	Highest sensory level	13.69 ± 01.36	14.26 ±0.72	0.12
Time for regression of sensory block (min)	2 segment regression	127.04 ±32.09	130.9 ±\24.61	<0.18
	Complete regression	265.76 ±38.49	284.8 ± 38.87	<0.17

Table 4:Comparison Of Motor Characteristics Of Subarachnoid Block Between Two Groups

Variables	Group S (Mean ± SD) Sitting	Group L (Mean ± SD) Lateral	P Value
Time to achieve grade I motor block (min)	03.72 ±00.78	03.75 ±00.88	0.8
Time to achieve grade II motor block (min)	05.75 ±01.13	05.92 ±01.15	0.8
Time to achieve grade III motor block (min)	10.88 ±01.72	10.91 ±01.85	0.9
Time to complete regression of motor block	203.44 ± 22.27	208.72 ± 22.57	<0.1

Table 5:Statistical Analysis Of Pulse Rate (Per/Min)

Pulse rate per minute at different time points.	Group S(Mean ± SD)	Group L(Mean ± SD)	Pvalue
Baseline	84.66 ± 07.03	83.80 ±07.40	0.5
Just after block	98.66 ± 06.85	90.12 ±06.88	0.7
5min after block	97.82 ± 06.65	87.22 ± 07.44	0.7
10 min after block	94.92 ± 06.43	82.82 ± 07.24	0.1
15min after block	88.02 ±05.72	81.78 ±06.84	0.1
20 min after bloik	85.42 ±05.73	83.26 ±05.49	0.1

Table 6:Statistical Analysis Of Systolic Blood Pressure, Diastolic Blood Pressure And Mean Arterial Pressure

Blood Pressure at different time points	Systolic Blood Pressure			Diastolic Blood Pressure			Mean Arterial Pressure		
	Group S	Group L	P	Group S	Group L	P	Group S	Group L	P
Baseline	125.0 ± 05.94	122.3 ± 07.83	0.05	77.82 ± 04.60	77.20 ± 04.60	0.51	93.50 ± 03.65	92.10 ± 04.40	0.8
JustAfter bloc block	120.2 ± 07.84	122.7 ± 07.19	0.09	72.62 ± 04.28	76.32 ± 06.24	0.22	88.34 ± 04.57	94.98 ± 25.11	0.65
5 min	110.6 ± 05.87	118.4 ± 06.95	0.33	74.42 ± 05.76	74.42 ± 06.89	0.99	89.04 ± 05.36	94.04 ± 05.95	0.99
10 min	110.6 ± 06.11	116.9 ± 08.29	0.82	72.12 ± 04.85	74.94 ± 06.27	0.87	85.14 ± 04.40	90.32 ± 05.88	0.86
15 min	110.7 ± 06.11	118.1 ± 07.99	0.76	71.66 ± 05.17	74.32 ± 06.01	0.76	84.72 ± 04.52	94.64 ^ 05.73	0.93
20 min	108.2 ± 04.98	119.3 ± 08.40	0.41	70.44 ± 04.17	76.68 ± 05.38	0.43	83.06 ± 03.84	92.82 ± 05.26	0.79

Table 7: Complications In Two Groups

Complications	Group S	Group L	P -value	Significance

	No. of PatientsSitting	No. of PatientsLateral		
Hypotension	5	3	>.05	Not significant
Bradycardia	3	2	>.05	Not significant
Nausea-Vomiting	4	2 .	>.05	Not significant
Others	2	1	>.05	Not significant

Table 8: Comfort Of The Patient

	% Sitting	% Lateral	P -value	Significance
Uncomfortable	15	3	<.05	significant
Same	6	2	<.05	significant
Comfortable	52	55	>.05	Not significant
Very Comfortable	2	15	<.05	significant

Results

There was no statistically significant difference for haemodynamic variables heart rate, systolic and diastolic blood pressure. The onset of anaesthesia was faster in the sitting group .The sensory block characterstics were statistically not significant as the onset was only slightly faster in sitting group but the duration and time to regression of sensory block was slightly more in lateral group.[p –value <.05%]. The motor block characteristics were almost similar in both the groups. The majority of patients who reported 'very comfortable' for induction position belonged to the lateral group.[p –value >.05%] The incidence of side effects and complications were almost same in both the groups[5-7]

Statistical Analysis: Maternal haemodynamic, block characteristic, side effects were recorded. Data were analysed using SPSS. 16.0 software and student's t-test, Chi-square test, and Mann Whitney U test were used for statistical analysis. p<0.05 was taken as statistically significant.

Discussion

Chadwick IS et al studied haemodynamic effects of the position chosen for the insertion of an catheter. An epidural catheter may be inserted with the patient either in the flexed left lateral or the sitting position. They studied, non-invasively, the haemodynamic changes associated with these positions maternal arterial pressure and fetal heart rate were monitored simultaneously.A significant reduction in stroke index (SI) occurred when the pregnant patients were repositioned from supine 15° wedged position to either flexed left lateral ($P < 0.01$) or sitting positions ($P < 0.05$). These changes in SI produced significant reductions in cardiac index (CI) in both groups. In the pregnant patients the CI was significantly lower in the flexed left lateral than in the sitting position ($P < 0.01$). Consequently maternal systolic blood pressure was lower in the flexed left lateral position ($P < 0.01$)Stoneham MD et al saw and postulated that oxford positioning is a novel positioning technique which was tested to see whether the unpredictability of block height and haemodynamic instability during spinal anaesthesia for caesarean section could be reduced. In this 'Oxford' position, the woman is placed left lateral with an inflated bag under the shoulder and pillows supporting the head. Following spinal injection the woman is turned to an identical right lateral position. This is maintained until just before incision to minimiseaorto-caval compression, when she is placed in the wedged supine position. Block height was more variable in group S than in group O. Blood pressure decreased by a greater amount initially: group S women required more ephedrine. Block height with spinal anaesthesia for caesarean section is more predictable and haemodynamically stable if the oxford position is used whilst anaesthesia develops.

Ortiz-Gómez JR et al studied effect of position on maternal haemodynamics during elective caesarean delivery under spinal anaesthesia. anaesthesia.No statistically significant effect seen in both positions

Simin A et al did a randomised clinical trial on effect of position during induction of spinal anaesthesia for caesarean section on maternal haemodynamic.They compared the variables after spinal anaesthesia in sitting or lateral decubitus position in patients undergoing c/s. Incidence of hypotension (50% vs 76.3%; p=0.016), bradycardia (0% vs 21.1%; p=0.014) and vasopressors consumption (36.2% vs 76.3%; p=0.012) were statistically lower in lateral position. There was no significant differences in sensory height (p=0.89) and duration of sensory and motor block between two groups (p=0.42, p=0.29; respectively). So they concluded that changes in maternal haemodynamic were significantly lower in lateral position than sitting position in patients undergoing spinal anaesthesia for c/s.

Prakash S et al did a prospective, randomized controlled trial comparing the left lateral, modified lateral and sitting positions for spinal block characteristics for Cesarean delivery. Maternal position affects spinal block characteristics. We investigated the effect of lateral, modified lateral and sitting position for spinal anesthesia with 2 mL hyperbaric bupivacaine 0.5% on spinal block characteristics in this prospective, randomized study.The modified lateral position with 10 mg of hyperbaric bupivacaine was associated with a slower onset and a lower maximum sensory block necessitating higher requirement for conversion to general anesthesia. It did not offer any advantage over lateral and sitting positions for induction of spinal anesthesia for elective Cesarean delivery and cannot be recommended.Similar study was done by Chevuri SB et al who did a comparative study of effects of sitting and lateral positions on quality of block during induction of spinal anaesthesia in patients undergoing cesarean section.In this study a comparison is done on all parameters of spinal anesthesia effects after giving block in sitting and lateral positions. The aim of the study is to assess effect of posture on quality of spinal block in patients undergoing caesarean section and to compare sitting and lateral positions during spinal anaesthesia Mathur A, Gupta A. Comparison of haemodynamic changes and level of block during Spinal anaesthesia-Lithotomy v/s Supine position using Ropivacaine and Bupivacaine. Comparisons are done even in midline and paramedian approaches of spinal anaesthesia . It can be given in two approaches midline and paramedian but is associated with technical difficulties in elderly patients due to calcified interspinous ligaments. Hence, this study was conducted to compare the efficacies of both the approaches in elderly. Paramedian approach of lumbar puncture is superior to the conventional midline approach in elderly patients with regard to first attempt success rates and other complications.[8-10].

Hypotension during spinal anaesthesia occurs commonly in parturients. By influencing spread of local anaesthetic, maternal position may affect the speed of onset of sensory block and thus the haemodynamic effects .Obasuyi BI et al did comparison of the haemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section. The aim of this study was to determine whether inducing spinal anaesthesia for caesarean section using plain bupivacaine in the lateral position

would result in less hypotension compared with the sitting position. Hypotension occurred less frequently when spinal anaesthesia for caesarean using plain bupivacaine was induced with patients in the lateral compared with the sitting position. Values for the lowest recorded mean arterial pressure were greater but values for the lowest recorded systolic blood pressure were similar for patients in the lateral position group.Shahzad K et al compared 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. Assessments of sensory, motor block and heart rate, systolic and diastolic blood pressure were recorded for 20 minutes. 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 v/s 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 almost similar effects on sensory and motor blockade and haemodynamic stability. However, patients generally found lateral position very comfortable. Therefore both sitting as well as lateral are novel positioning techniques which was tested to see whether the unpredictability of block height and haemodynamic instability during spinal anaesthesia for caesarean section could be reduced.

What This Study Add to Existing Knowledge

Hypotension is common after spinal anaesthesia during caesarean section (c/s). Methods for prevention of hypotension are mechanical approaches such as leg rise, compression stocks and positioning. On the other hand, mother position may have an effect on haemodynamic variables due to speed of onset of sensory block. Position during induction has maternal and foetal importance. Therefore both sitting as well as lateral are novel positioning techniques .

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