

Comparison of Various Parameters after Induction of Spinal Anaesthesia for Caesarean Section in Sitting and Lateral Position

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Abstract

Background: Hypotension is one of the common complications in patients undergoing surgeries under spinal anaesthesia. This phenomenon is comparatively more in pregnant women undergoing caesarean section under spinal anaesthesia due to anatomical variations in the spinal cord and physiological changes in pregnant women. Maternal position may influence the spread of the local anaesthetic drug. So, in this study we have aimed to compare incidence of hypotension and various other parameters like onset of sensory and motor blockade, total number of mepentermine incremental doses (5mg/dose) required in each group to correct hypotension after induction of spinal anaesthesia in sitting and lateral position for caesarean sections.

Methods: Seventy American Society of Anesthesiologists physical status I and II patients undergoing elective caesarean section were randomly divided into two groups by closed envelope technique to receive spinal anaesthesia in the lateral position (Group L) or the sitting position (Group S). In Lumbar (L3-4) interspace, lumbar puncture was done after taking aseptic precautions, plain bupivacaine 0.5% heavy 10 or 12 mg according to the height was injected after confirming free flow of cerebrospinal fluid. After this, they were

placed in the supine position immediately with right wedge providing for left lateral uterine displacement to avoid supine hypotension syndrome. Maternal blood pressure was measured every minute for 5 minutes, every two min for 10 min and 5-minutely thereafter. Hypotension was defined as a fall in systolic blood pressure >20% of the baseline value or a value <90 mmHg.

Results: Statistical studies showed that number of patients who received spinal anaesthesia in lateral position had significantly more incidences of hypotension (19 incidences) compared to those who received in sitting position (10 incidences) with P value being (P= 0.048). And also there was faster onset (average time) of action (sensory and motor) in Group L (5 minutes for sensory and 6.2 minutes for motor) than compared to Group S (7 minutes for sensory and 7.4 minutes for motor) but not statistically significant (P= 0.361 for sensory and 0.639 for motor). We also observed that, total number of incremental doses (5mg/dose) of mepentermine used were more in patients who received spinal anaesthesia in lateral position (n= 10 increments) than compared to those who received in sitting position (n=5 increments) but it was not statistically significant (P=0.145).

Conclusion: Spinal anaesthesia given in lateral position of the patients for caesarean section causes significantly more incidences of hypotension than that given in sitting position. And there were no significant differences with respect to onset of sensory and motor block and mepentermine requirement between the groups.

Keywords: Spinal Anaesthesia; Sitting Position; Lateral Position; Hypotension; Mepentermine.

Introduction

Spinal anaesthesia is the preferred anaesthesia technique for caesarean section as it produces adequate anaesthesia, analgesia and adequate motor block while keeping the patient conscious [4]. Spinal anaesthesia can be administered to patients in sitting and lateral

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position. There has been a consistent debate as to which position is better for inducing spinal anesthesia in caesarean section [11], and each position has its own advantages and disadvantages [1]. Some studies have preferred sitting position to be better, based on their results [12,13]. In sitting position the landmark identification is easier [2], while in lateral position the landmark identification might be difficult but sedated patients can be maintained in lateral position for long time comparatively [2]. Some studies have shown lateral position has lesser incidences of hypotension than sitting position and some studies have shown the opposite one [2].

Hence the present study was designed to compare the incidences of hypotension and various other parameters like onset of sensory and motor block, mephentermine requirement in the patients after induction of spinal anesthesia in sitting and lateral position for caesarean sections.

Materials and Methods

Seventy parturients (18-40 years, American society of anesthesiologist-ASA I and II) undergoing elective caesarean section(studied for 18 months) at P.E.S.I.M.S.R, Kuppam were considered, informed written consent was taken and subjects were randomly allocated into two groups by closed envelope technique before performance of spinal anesthesia. Group S(sitting) ($n = 35$) patients were placed in the sitting position, group L ($n = 35$) patients in the lateral position, after sub-arachnoid block was given, patients were put back to supine position. Sample size is determined this way, the range of time (minutes) to reach T₄ sensory block is 5.5 minutes (Group L) and 6 minutes (Group S) and standard deviation worked out to be 1.4 and 1.5 respectively. Accordingly, 35 patients in each group achieved 80% power to detect mean difference of 1 with 5% level of significance.

Exclusion Criteria

Patients with significant cardiovascular diseases like mitral stenosis, ischemic heart diseases, respiratory, spinal problems, liver disorders, deranged renal functions and local infection. Surgery prolonged for more than 45 minutes, total blood loss more than 750ml.

Injection ranitidine 50 mg intravenous, 30 minutes before shifting to operation theatre was given as premedication. Patients were cannulated with 18G

intravenous cannula, and preloaded with 20 ml/kg of Ringers lactate solution half an hour before intrathecal injection. In the operation theatre, pulse rate, blood pressure, electrocardiogram, and oxygen saturation were noted and parturients were appropriately positioned according to the groups allocated. Patients were positioned with the help of assistance. For the left lateral position, the legs were brought to rest on the abdomen after flexion, and chin touching the chest. For the sitting position, the legs were placed on the edge of the table and the feet supported down, a pillow was placed on her lap, and the arms wrapped around the pillow, resting on the flexed lower extremity.

Under aseptic measures lumbar puncture done at L3-L4 space with 25G Touhy needle, free flow of the cerebrospinal fluid was ascertained and 2ml (10 to 12mg based on the height) of 0.5% bupivacaine heavy was injected. The spinal needle was removed, and the patient turned to the supine position immediately. The sensory block was tested by the loss of sensation to touch.

Motor blockade was assessed by *modified Bromage scale*:

0 = no motor paralysis; 1 = not able to raise extended legs but able to flex at knee and ankles; 2 = not able to raise extended legs and flex the knees but able to move feet; 3 = unable to flex ankles or feet).

Observations

The time taken from the initiation of sub-arachnoid block to the achievement of sensory blockade up to T₄ dermatome was recorded. The time taken from the initiation of sub-arachnoid block to the achievement of maximum motor blockade (bromage score 3) is also noted. And average time calculated for sensory and motor onset for each groups. Maternal blood pressure was measured every minute for 5 min, every two min for 10 min and 5-minutely thereafter. Hypotension was noted when there was a fall in systolic blood pressure (SBP) >20% or a systolic pressure value of <90 mmHg. The total number of incidences of hypotension in each group was noted and recorded. Injection mephenteramine 5 mg IV (intravenous) increments were used to return SBP > 90 mmHg and the total number of times of such mephenteramine increments used were recorded in each group. The results obtained from the study were statistically analyzed using one way ANOVA for continuous data and Chi-square test for categorical data using SPSS version 16. A *P* value of <0.05 was considered significant.

Results

each, Group L (spinal anesthesia given in left lateral position of patients), Group S (Spinal anesthesia given in sitting position of patients).

Study design consists of two groups of 35 patients

Table 1: Weight (kilograms) distribution of patients

Variables	Group L	Group S	P Value
Weight (kilograms)	53+/-5.6	53.4+/-4.3	0.9348

Weight distribution statistically matched in the two groups

Table 2: Age distribution of patients

Age in years	Group L		Group S		P value
	No	%	No	%	
18-20	7	20	6	17.14	0.758
21-30	15	42.85	16	45.71	0.809
31-40	13	37.14	13	37.14	1.000
Total	35	100.0	35	100.0	
Mean ± SD	27.51±6.19		27.68±5.17		

Age distribution matched in the two groups

Table 3: Incidence of hypotension, Vasopressors requirement and other spinal anesthesia parameters

	Group L	Group S	P Value
Total Incidences of hypotension in the groups	19	10	0.048*
Total number of Mephentermine increments required in the groups(5mg/ dose)	10	5	0.145
Average time in minutes to reach maximum bromage score of 3 from the initiation of spinal anaesthesia	6.2	7.4	0.639
Average time in minutes to reach T4 level of sensory block from the initiation of spinal anaesthesia.	5	7.0	0.361

*statistically significant

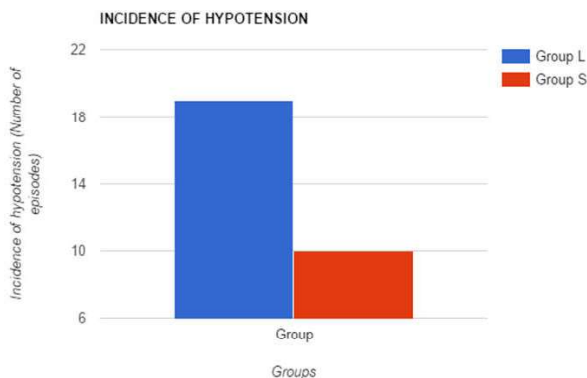


Fig. 1: Incidence of hypotension

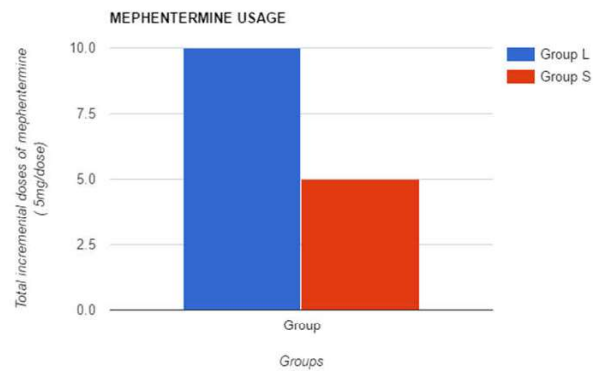


Fig. 2: Mephentermine increments

Discussion

Spinal anesthesia under sitting and lateral position may influence the spread of local anesthetic drug and

consequently the blockade [3]. Normally, reduced systemic vascular resistance is compensated by increase in cardiac output, but in patients under spinal anesthesia this compensatory method is lost

leading to hypotension [4]. In sitting position the landmark identification is easier [7], while in lateral position the landmark identification might be difficult but sedated patients can be maintained in lateral position for long time comparatively.

Mendonca et al. have shown that hypotension was less frequent among mothers placed in the left lateral position (64%) than among those placed in the tilted supine position (90%) [5]. Studies done by Inglis A, Daniel M showed that mothers in lateral group required more ephedrine than sitting [6].

Coppejans HC, Hendrickx E et al in 2006 showed that, performing a CSE(combined spinal epidural) technique for cesarean delivery in the sitting position was easier and caused less severe hypotension [7].

In our study, the incidences of hypotension was significantly more in patients who were given spinal anesthesia in lateral position (19 times) than those who were given in the sitting position (10 times) with P value being 0.048 which is significant. The average time to reach T4 sensory level block and maximum bromage score is less in patients who were given spinal anesthesia in lateral position(5 minutes and 6.2 minutes respectively) than those who were given in sitting position(7 minutes and 7.4 minutes respectively), but not significant (P= 0.361 and 0.639 respectively) In this study, total number of mephentermine (vasopressor) incremental requirement (5mg/dose) to increase the systolic blood pressure to greater than 90mmhg in patients having hypotension, were more in patients in whom spinal anesthesia were given in lateral position (n=10) than those patients who were given spinal anesthesia in sitting position(n=5) but not statistically significant. (P=0.145) Age, weight were statistically matched such that they will not interfere with the results in our study.

Conclusion

Spinal anesthesia given in lateral position of the patients for caesarean section causes significantly more incidence of hypotension than that given in sitting position. And there were no significant differences with respect to onset of sensory and motor block and mephentermine requirement between the groups.

References

- David J. Birnbach, Ingrid M. Browne. Anesthesia for Obstetrics. In: Miller RD, ed. Anesthesia. 7th ed. Churchill Livingstone, An Imprint of Elsevier, 2009. p.2203-40.
- Kelly JD, McCoy D, Rosenbaum SH, Brull SJ. Haemodynamic changes induced by bupivacaine heavy (hyperbaric) during lateral decubitus or supine spinal anaesthesia. *Eur J Anaesthesiol* 2005; 22:717-22.
- Zohar E, Nog Y, Laboritck I, Fredman B. Intrathecal anesthesia for elderly patient undergoing short transurethral procedure: a dose finding study. *Anesth Analg* 2007; 104:552-4.
- Thomas DG, Robson SC, Redfern N, et al. Randomized trial of ephedrine bolus or phenylephrine bolus for maintenance of arterial pressure during spinal anaesthesia for Caesarean section. *Br J Anaesth.* 1996; 76:61-65.
- Mendonca C, Griffiths J, Ateleanu B, Collis RE. Hypotension following combined spinal-epidural anaesthesia for Caesarian section. Left lateral position versus tilted supine position. *Anaesthesia.* 2003; 58:428-31.
- Inglis A1, Daniel M, McGrady E. Maternal position during induction of spinal anesthesia for caesarian section. A comparison of right lateral position and sitting position. *Anaesthesia.* 1995 Apr; 50(4) 363-5.
- Coppejans HC1, Hendrickx E, Goossens J, Vercauteren MP. The sitting versus right lateral position during combined spinal epidural anesthesia for cesarian section: block features and severity of hypotension. *Anesth Analg.* 2006 Jan; 102(1):243-7.
- Hallworth SP1, Fernando R, Columb MO, Stocks GM. The effect of posture and baricity on the spread of intrathecal bupivacaine for elective cesarian section. *Anaesth-Analg.* 2005; 100:1159-1165.
- Chumphathong, S., Chinachoti, T., Visalyaputra, S., Himmunngan, T. Incidence and risk factors of hypotension during spinal anaesthesia for caesarean section at Siriraj hospital. *J Med Assoc Thai.* 2006; 89: 1127-1132.
- Gori, F., Corradetti, F., Cerotto, V., Aldo Peduto, V. Influence of positioning on plain levo-bupivacaine spinal anaesthesia in cesarean section. *Anesthesiol Res Pract.* 2010; pii212696.
- Stephen P Hallworth, Roshan fernando et al. Effect of posture and baricity on the spread of intrathecal bupivacaine for elective caesarean delivery. *Anaesth-Analg.* 2005; 100:1159-1165.
- Ece Dumanlar Tan, Berrin Gunaydin. 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.
- G Hocking, JAW Wildsmith. Intrathecal drug spread. *BJA* 2004; 93(4):568-578.
- Russell IF. A comparison of cold, pinprick and touch for assessing the level of spinal block at caesarean section. *International Journal of Obstetric Anesthesia* 2004; 13:146-52.
- Robert H Riffenburg (2005), *Statistics in Medicine*, second edition, Academic press. 85-125.
- John Eng (2003), *Sample size estimation: How many Individuals Should be Studied?* *Radiology* 227: 309-313.