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INFLUENCE OF MATERNAL POSITIONING, SITTING VS LATERAL FOR SPINAL ANAESTHESIA WITH 0.5% ISOBARIC LEVOBUPIVACAINE IN ELECTIVE CAESAREAN SECTIONS – A PROSPECTIVE, RANDOMIZED COMPARATIVE STUDY

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ABSTRACT
Introduction: Spinal anaesthesia is a commonly employed anesthetic technique for caesarean sections. Levobupivacaine is a new long acting amide, local anesthetic. Only few studies have investigated spinal anaesthesia using plain levobupivacaine in obstetrics and the effect of posture on spinal anaesthesia in parturients. Objective: The objective of our study was to find out the effect of position sitting vs lateral using Isobaric 0.5% levobupivacaine 2ml on spinal anaesthesia in parturients undergoing caesarean section on sensory and motor block. Methodology: Fifty American Society of Anesthesiologists physical status class II parturients scheduled for elective lower segment caesarean section under subarachnoid block were randomly allocated into two groups (n = 25), Group S – Isobaric Levobupivacaine 0.5% 2ml administered in sitting posture and Group L – Isobaric Levobupivacaine 0.5% 2ml administered in lateral posture. The sensory and motor block characteristics were recorded. Results: In our study, we observed that the mean time for onset of sensory block at T 10 level in group S was 2.4 ± 0.53 minutes while 2.9 ± 0.74 minutes in Group L (p value = 0.0071). In our study the highest level of sensory block achieved was T4 and T5 in sitting and lateral group respectively and is statistically significant. The time for maximum sensory block in sitting group was 3.82±1.10 minutes and in Lateral group was 4.27±0.91 minutes. The Time for 2 segment regression was 81.80±18.54 minutes in Group S whereas 82.40±22.67 minutes Group L. The time for onset of motor block was 2.28±0.39 minutes in Sitting Group whereas 2.26±0.36 min in Lateral Group. The mean time to complete motor blockade was 3.38 ± 0.70 min in Group S and 3.87 ± 0.82 min in Group L. The duration of motor block was 193.88 ± 51.98 min and 191.20 ± 40.25 min in Sitting group and Lateral group respectively. Conclusion – 0.5% plain levobupivacaine when used in parturients for spinal anaesthesia for caesarean sections produces early onset of sensory blockade, and shorter time for maximum motor blockade and also higher sensory level in sitting position than in lateral position. However, there was no difference in the duration of sensory and motor blockade.

Keywords: Caesarean section, Spinal anaesthesia, Levobupivacaine, Sitting, Lateral

INTRODUCTION:

Spinal anaesthesia (SA) is the preferred technique for caesarean sections(CS), which is easy to perform and it has multiple advantages like easy to perform, provides rapid onset also of anaesthesia and good motor relaxation.

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General anaesthesia (GA) is considered to produce more complications in parturient. The airway of the pregnant women is considered to be difficult due to the physiological changes of pregnancy, it becomes more difficult during labor and immediate post-partum, because of this general endotracheal anaesthesia may be riskier as there is an increased chance of can't intubate, can't ventilate situation leading to severe hypoxemia. Parturient are also considered to have full stomach which adds to the risk of aspiration under GA.

Spinal anaesthesia for caesarean section conveys significant advantages over epidural anaesthesia such as the simplicity of its use, complete motor relaxation and the speed of onset, which allows neuraxial anaesthesia in urgent CS and thus reduces the necessity for general anaesthesia.(1) Placing an epidural catheter in parturients is difficult as mother may not be able to flex properly, there are chances of intravenous catheter placement due to engorged epidural veins and there is occasional intrathecal catheter placement. CS is a relatively short duration procedure that is often followed by early mobilization of the patient, hence spinal anaesthesia is the preferred choice over epidural anaesthesia. Traditionally hyperbaric drugs are used for spinal anaesthesia for caesarean section – like hyperbaric 0.5% Bupivacaine, as one can easily predict the movement of the drug in the cerebrospinal fluid (CSF). One of the problems with Hyperbaric drugs is that they can produce very high blocks in pregnant women because of engorgement of epidural veins as a result of aortocaval compression and high CSF pressures. (2)

SA is usually administered in parturient either in sitting or lateral position. During the shifting of parturient from either sitting or lateral to the supine position after administration of Hyperbaric solutions, there can be further movement of the drug inside the CSF producing an unintentional higher level of sympathetic block. This can also be a reason for increased incidence of hypotension or bradycardia with hyperbaric drugs after mobilization (3) Local anesthetics(LA) which are isobaric when introduced into the CSF for SA, may not have much variation in the level of block with patients' movement after the administration. Because of this the level of sympathetic block produced may not be very high and the incidence of 18 hypotension and bradycardia may also be less. Hence, of late isobaric drugs are also being used for spinal anaesthesia in caesarean section.

The present study will try to bring out the influence of position for spinal anaesthesia using 0.5% isobaric levobupivacaine in pregnant women. In this randomized, single-blinded study, the hypothesis formed was null hypothesis, that position should not influence the characteristics of S A with plain 0.5% levobupivacaine

Objective:

Comparison between sitting and lateral postures for spinal anaesthesia using 2ml 0.5% isobaric Levobupivacaine for elective caesarean sections regarding the effect on level of sensory block

Materials and Methods:

The present Prospective Randomized Controlled study was done in the Department of Anesthesia at JSS Medical College and Hospital, Mysore from November 2016 to July 2018.

Based on the previous studies [3,4,6] 46 parturients were required to be included in order to detect a difference between the 2 groups of 2 dermatomes of sensory level reached after a subarachnoid block(SAB) with an alpha error of 0.05 and a power of 0.8. In our study we selected a total of 50 patients with 25 in each group were allotted based on the Random allocation number in order to compensate for drop outs.

Group S – Isobaric Levobupivacaine 0.5% 2ml administered in sitting posture

Group L – Isobaric Levobupivacaine 0.5% 2ml administered in lateral posture

INCLUSION CRITERIA: - • Age between 20 – 35 years • Height 150 – 170 cm • Body mass index < 28kg/m2 • Singleton pregnancy

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EXCLUSION CRITERIA: - • Patients having contraindications to spinal anaesthesia, viz, patient refusal, local infection, allergy to local anesthetics, bleeding disorders, spinal deformity, severe congenital or acquired heart disease, hemorrhage or hypovolemic shock (each condition ruled out via good history, clinical examination, & or investigations) • Known sensitivity to the study drugs

Thorough pre-anesthetic evaluation of the parturients including relevant investigations were done, demographic parameters (age, height, weight and body mass index) were noted. Data 65 was collected in pretested proforma meeting the objectives of the study. Parturients were premedicated with Tab. Ranitidine 150mg orally night before surgery. Parturients were fasted 6 hours for solid food and 2 hours for clear fluids. On the day of the surgery, the parturients were shifted in a left lateral position, a peripheral 18-gauge intravenous (IV) cannula was inserted, all parturients were given IV ranitidine 50mg and metoclopramide 10mg and were started with IV infusion of 10ml/kg body weight of Ringer Lactate (RL) infused 30 min before the spinal anaesthesia. After connecting multiparameter monitors with ECG, pulse oximeter and Non Invasive Blood Pressure (NIBP), basal parameters were recoded. Supplementary oxygen was provided at the rate of 5 litres/min via a face mask. Parturients in Group S were placed in the sitting position. After disinfecting the skin and infiltrating with 2% lidocaine, lumbar puncture was performed at the L3-4 interspace using a 25-gauge Quincke needle using 2ml of 0.5% Levobupivacaine was administered after confirmation of free flow of CSF at the rate of 0.5ml/sec and made to sit for 2 min and then turned to supine posture with a wedge underneath right buttock. Parturients in L Group, spinal anaesthesia was administered using 2ml of 0.5% Levobupivacaine at the rate of 0.5ml/sec in right lateral posture and turned to supine posture with a wedge underneath right buttock after 2 mins. Time of completion of administration of the test drug in to the intrathecal space was considered time zero. The spinal anaesthesia was given by the anesthesiologist who is involved with randomization of parturients and the observer was a different anesthesiologist who entered the operation theatre after supine positioning of the parturient. By this, the observer was blinded to study position. The sensory level of spinal anaesthesia was assessed bilaterally in the mid clavicular line by pinprick, using a short bevelled 25 G needle, and was recorded at baseline prior to spinal injection, then every minute for the first 15 min after the parturient was positioned in the supine posture, and every five minutes for the next 30 min, and at 45th min. Blood Pressure(BP), heart rate (HR), and the extent of motor block were recorded at the same measurement intervals. Permission to perform the surgery was given once a T6 level had been achieved. Motor block was studied using modified Bromage Scale (0= No paralysis ,1= Unable to raise extended leg; able to bend knees ,2= Unable to bend knee, able to flex ankle, 3=No movement.).

Results:

The present study was carried out in the Department of Anesthesiology, JSS Medical College and Hospital, Mysore, to find out the Influence of maternal 69 positioning, sitting (Group S) vs lateral (Group L) position on 2ml of 0.5% isobaric Levobupivacaine Spinal Anesthesia in Elective Caesarean Section.

Table 1: Comparison of Demographics of the study Population

	Group S		Group L		P Value
	Mean	SD	Mean	SD	
Age	24.84	3.16	25.04	4.50	0.586
Weight	64.64	5.21	63.28	7.70	0.468
Height	156.28	4.33	156.32	4.20	0.974
BMI	26.50	2.23	25.87	2.74	0.374

The mean age of the patients in Group S was 24.84 ± 3.16 years and in Group L was 25.04 ± 4.50 years. The differences in the mean age between the two groups were statistically insignificant, p = 0.856. The mean weight of patients in Group S was 64.64 ±5.21 kg and in Group L was 63.28 ± 7.70 kg. The differences in mean weight between the two groups were statistically insignificant (p = 0.468). The mean height in Group S was 156.28±4.33 cms and 156.32 ± 4.20 cms in Group L. The difference between the two groups with regard to height was not statistically significant. (p = 0.974). The mean BMI in Group S

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was 26.50± 2.23 kg/m2 and 25.87 ± 2.74 kg/m2 in Group L. The difference between the two groups with regard to height was not statistically significant. (p = 0.374)

Table 2: Distribution of Study Subjects based on the Sensory Block

	Group S		Group L		P Value
	Mean	SD	Mean	SD	
Onset of sensory block (min)	2.4	0.53	2.9	0.74	0.0071
Time for Maximum level of sensory block(min)	3.82	1.10	4.27	0.91	0.118
Maximum level of Sensory Block	T4	0.78	T5	0.89	0.001
Duration of sensory block (min)	135.72	34.74	137.48	36.88	0.862

The mean time for onset of sensory block in Group S was 2.4±0.53 minutes and 2.9±0.74 minutes in Group L. Hence there was earlier onset of sensory block in Group S which was significant (p value 0.0071) statistically but not clinically significant. The mean time for maximum sensory level was 3.82±1.10 minutes in Group S and 4.27±0.91 minutes in Group L. Hence time to achieve maximum sensory level was earlier in Group S compared to Group L and this was not significant (p– 0.1182). The maximum level of sensory block was T4 in sitting posture compared to T5 in the lateral position which is statistically significant (p - 0.00143). The mean time for duration of sensory block in Group S was 135.72±34.74 minutes and 137.48±36.88 minutes in Group L. The difference between the two groups was not statistically significant. (p =0.8628).

Table 3: Distribution of Study Subjects based on the Motor Block

	Group S		Group L		P Value
	Mean	SD	Mean	SD	
Onset of Motor block (min)	136.80	23.80	136.00	22.17	0.902
Degree of motor block – Modified Bromage scale 3	100 %		100 %		
Time for maximum level of motor block(min)	3.38	0.70	3.87	0.82	0.030
Duration of Motor block (min)	193.88	51.98	191.20	40.25	0.839

The mean time for onset of motor block in Group S was 2.28±0.39 minutes and 2.26±0.36 minutes in Group L. The difference between the two groups was not statistically significant. (p =0.9026). The mean time to complete motor blockade was 3.38 ± 0.70 minutes in Group S and 3.87 ± 0.82 minutes in Group L. Hence time taken for complete motor block was significantly shorter in Group S ($p<0.05$). The mean time for duration of motor block was 193.88±51.98 minutes in Group S and 191.20±40.25 minutes in Group L. Hence the total duration of motor block was statistically not significant (p=0.8394).

DISCUSSION:

Obstetric anesthesiologists are faced with the challenge of providing anaesthesia for caesarean sections, providing care for both the mother and the unborn baby. A team approach is imperative to ensure optimal outcome while ensuring that the labor process is a safe and pleasant experience for the parturient. There has been an increasing trend in the caesarean section rate especially after the advent of ultrasonography, with a move towards more caesarean sections being performed under regional anaesthesia compared to general anaesthesia. [4] This is also to avoid complications associated with general anaesthesia especially gastric contents aspiration and its consequences and airway problems.

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our study, parturients were randomly divided into 2 groups of 25 parturients each - Group S received 2 ml of 0.5% isobaric levobupivacaine in sitting position whereas Group L received 2 ml of 0.5% isobaric levobupivacaine in lateral position.

The time for onset of sensory block was 2.4 ± 0.53 minutes in Group S while 2.9 ± 0.74 minutes in Group L (p value = 0.0071). This showed that it was statistically significant however, it was not significant clinically.

In a similar study like ours, Sreekanth R. et al [5] found that 90% in both groups of patients sitting and lateral, had the onset time to T10 within 3-4 minutes and it was not statistically significant. The reason may be the dose of levobupivacaine used in their study was 12.5 mg which is higher than the dose used in our study.

Gori et al [6] conducted a study on 46 parturients in which one group was made to sit for 2min after injection of local anesthetic into the subarachnoid space while the other group was immediately made supine. There was no statistical difference in the onset time of sensory block in the two groups, probably because of the difference in methodology, wherein all the parturients were given SA in the sitting posture only.

Gulen Guler et al [3] in their study administered levobupivacaine in sitting position found out that the onset of sensory time for levobupivacaine was 2 ± 0.37 min, which compares with our study.

The onset time of sensory block of Goyal et al [7] was 4.9 + 1.8 min in left lateral posture which is longer than our study. They have used 25 μg of fentanyl as adjuvant which might have reduced the baricity of the test drug. The authors have also not studied the baricity of the combination.

Several reports show that plain bupivacaine has a tendency to give unexpectedly high levels of blocks, often after a position change and even after a reasonable time frame has been given to allow for fixation. It has been found out that all “plain” anesthetic solutions are actually hypobaric and tend to spread cephalad, causing these late complications. Levobupivacaine however should not produce such effects as its specific gravity is similar to CSF in pregnant women. In our study the highest level of sensory block achieved was T4 and T5 in sitting and lateral group respectively and is statistically significant. Higher level of sensory block in sitting group can occur due to sudden change of position from sitting to supine resulting in turbulence in the CSF which can result in cephalad spread of the drug or it could be that 0.5% plain levo bupivacaine is behaving like a hypobaric drug in the CSF.

In a similar study by Sreekanth et al [5], the authors have not specified the highest level of block achieved in both the groups and hence we are not able to compare our results with their study.

Guler et al [3] in their study of administering 10 mg of levobupivacaine in sitting posture found the highest level of sensory block to be T4 which compares with our study.

In the study conducted by Gori et al [6] the highest sensory dermatome level achieved was T5 in the sitting group where patients were kept for 2 minutes in sitting position before supine posture and also in the group immediately brought to supine posture and was statistically not significant. The difference of results in their study compared to our study is due to the parturients being taller (163cm) compared to the height of our study parturients (156cm).

In the study conducted by Bidikar et al [8] the highest level of block in the lateral posture with 10 mg of levobupivacaine was T4. In this study the parturients were brought to supine from lateral immediately after administration of SA and hence the difference with our study.

In our study the time for maximum sensory block in sitting group was 3.82±1.10 minutes and in Lateral group was 4.27±0.91 minutes which was statistically not significant. Sreekanth et al [5] have also not mentioned the time for maximum sensory spread for the test drugs and hence we could not compare with their study.

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In a study done by Goyal et al [7] the maximum time taken for levobupivacaine 10 mg with fentanyl 25 μg was 5.86±1.69 minutes when SA was administered in the lateral position which is longer than our results. The difference may be due to the addition of fentanyl which might have decreased the density of the mixture.

The mean time for duration of sensory block in Group S was 135.72 ± 34.74 minutes and 137.48 ± 36.88 minutes in Group L. The difference between the two groups was not statistically significant. (p =0.8628) Goyal et al [7] in their study administered isobaric 0.5% levobupivacaine in lateral position, the total duration of sensory block was 128.34 + 14.63 minutes which is comparable to our study.

In study by Ozyilkan et al [9] the duration of sensory block as 211.72 + 51.88 which is of longer duration than our study as the authors have added opioids to the LA. Bidikar et al [8] found out the duration of sensory block as 112.97 + 19.42 minutes which is shorter as compared to our study as they have used 7.5 mg 0.5% isobaric levobupivacaine along with 12.5 μg fentanyl.

The time for onset of motor block in our study was 2.28±0.39 minutes in Sitting Group whereas 2.26±0.36 min in Lateral Group which was statistically not significant. Since the Bromage scale gives an indication of blocking of lumbar and sacral motor fibers we did not find any statistical difference in the onset time between our study groups as these fibers start getting blocked early in both sitting and lateral postures.

In a study by Goyal et al [7] they administered the drug in lateral position and found that the time for motor block was 3.9+ 0.71 (mins). However, which is longer than our study, maybe because of the adjuvant fentanyl used in their study.

Bidikar et al [8] in their study have found the onset of motor block time as 2.5 + 1 minutes which is comparable to our study. In study by Guler et al [3] it was 4.1 + 0.88 min which is longer as compared to our study probably because of fentanyl used as an adjuvant.

We have taken the onset of motor block from the administration of the test drug till the parturients developed motor block of Bromage. Whereas all the other studies except Goyal et al [7] Guler et al [and] Bidikar et al [8], have taken the time from the completion of the administration of the drug till the parturients develop Bromage 3 motor block. Hence we could not compare our onset timings with the other studies.

The mean time to complete motor blockade was 3.38 ± 0.70 min in Group S and 3.87 ± 0.82 min in Group L. Hence time taken for complete motor block was significantly shorter in Group S ($p<0.05$) probably due to the sudden movement of the study drug when the patient is made to lie supine from sitting posture or the drug behaving like a hypobaric drug.

In study by Guler et al [3] it was 11.36 + 2.35 min which is longer as compared to our study probably as the authors have added 15 μg fentanyl as an adjuvant.

Gautier et al [10] in their study found it to be 13 minutes, which is longer than our study as they have used only 8 mg isobaric 0.5 % levobupivacaine. Dar et al [11], Goyal A et al [7] also found motor onset time similar to our study.

In our study the duration of motor block was 193.88 ± 51.98 min in Sitting Group and 191.20 ± 40.25 min in Lateral Group which is statistically not significant. Dahiya et al [12] in their found the total duration of motor block 182.4+29.59 minutes which is comparable our study.

Sreekanth et al [5]in their study found the total duration of motor block as 157.90 minutes.

In the study by Gori et al [6] it was 150 min in seated group whereas 159 min in supine group.

In contrast to our study, Bidikar et al [8] found it to be 87.83 + 15.04 (min) which was shorter compared to our study.

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Goyal A et al [7] and Guler et al [3] in their studies also found it to be shorter compared to our study.

CONCLUSION:

Isobaric 0.5% levobupivacaine when administered in sitting posture showed faster onset of sensory block, shorter time for maximum motor block and also higher level of sensory block. Both sitting and lateral position were clinically effective for providing adequate subarachnoid block. Hence isobaric 0.5% levobupivacaine provides good sensory and motor block when administered in either sitting or lateral position in parturients for elective caesarean section.

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