

Comparison of the effects of lateral and sitting position during induction of spinal anaesthesia with plain levobupivacaine in caesarean section

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Abstract

Introduction: Spinal anaesthesia is a commonly employed anaesthetic technique for caesarean section. Levobupivacaine is a new long acting amide, local anaesthetic. Only few studies have investigated spinal anaesthesia using plain levobupivacaine in obstetrics. Levobupivacaine has all the desirable qualities of local anaesthetics like with rapid onset, wide margin of safety, adequate surgical anaesthesia with minimal side effects on the mother as well fetus.

Aim and Objectives: To study the effects of spinal anaesthesia induced in lateral and sitting position during caesarean section using plain levobupivacaine.

Materials and Methods: The study was carried out in tertiary care centre between Jan. 2014-June 2015 on total 100 patients posted for caesarean section. The parameters observed included- Sensory blockades onset and its duration, motor blockades onset, duration and degree and quality of anaesthesia.

Results: In group L (that received plain levobupivacaine in left lateral position) 90% of patients had onset to T10 in 3-4 minutes. Onset of sensory block in group L was in 3.62 ± 0.09 minutes and 3.77 ± 0.11 minutes in group S (those received plain levobupivacaine in sitting position). Two dermatome regression in group L were 80.96 ± 1.75 min and in group S were 81.44 ± 1.70 minutes. Motor onset in group L and S was 5.747 ± 0.375 minutes and 5.876 ± 0.396 min respectively. Total duration of motor block in group L was 157.90 ± 3.23 minutes.

Conclusion: We concluded that 12.5mg dose of isobaric levobupivacaine 0.5% provides effective spinal anaesthesia, ensures haemodynamic stability, excellent quality of sensory and motor block with no influence of gravity on the spread in sitting as well as lateral position.

Keywords: Caeserian, Lateral, Levobupivacaine, Spinal.

Introduction

Spinal anaesthesia was introduced into clinical practice by August Karl Gustav Bier and his assistant August Hilderbrandt in the year 1898 when general anaesthesia was the only other alternative available.¹

Subarachnoid block (SAB) is the most common anaesthesia technique for performing caesarean section.² The technique is simple, safe, reliable and has rapid onset. Epidural anaesthesia was considered the preferred method for caesarean delivery but the limitation was delayed onset in urgent caesarean section.³ SAB in pregnant women is associated with increase in incidence of hypotension due to higher sympathetic block, which is further aggravated by aortocaval compression of gravid uterus.³ Maternal blood pressure can be maintained with, left lateral tilt, low dose vasopressors and preloading of fluid. The ideal drug for SAB would provide rapid onset, adequate surgical anaesthesia together with greater safety margin, early ambulation and ability to void to allow early discharge.

Many local anaesthetics have been used for spinal anaesthesia in various strengths and volumes. Lignocaine was the most widely used local anaesthetic for spinal anaesthesia in caesarean section because of

its faster onset and shorter duration of action. But the incidence of transient neurologic symptoms (TNS) with lignocaine made it less popular.^{4,5} Bupivacaine is long acting and is one of the most commonly used local anaesthetic for SAB but its accidental intravenous injection may cause cardiotoxicity and severe hypotension.⁶ Levobupivacaine, the pure S (-) enantiomer of racemic bupivacaine, is a new long acting amide, local anaesthetic,⁷ with a wide margin of safety, low cardiotoxicity and is equipotent to bupivacaine. Since levobupivacaine has all the advantages of bupivacaine it may be an ideal local anaesthetic for SAB.

Local anaesthetics which are hyperbaric as compared to cerebrospinal fluid produce more reliable spread when injected intrathecally.⁸ Though it is reliable but may be associated with risk like transient neurologic symptoms.^{4,5} Only few studies have investigated obstetric spinal anaesthesia using plain levobupivacaine.⁹ The density of cerebrospinal fluid in obstetric patients is comparatively lower and plain levobupivacaine has been shown to be truly isobaric with respect to cerebrospinal fluid of pregnant women. This property may translate to a more predictable spread of drug. Hence, we have used plain

levobupivacaine for study. Dose requirement of local anaesthetic agent is low in pregnant when compared to non-obstetric patients. Levobupivacaine possesses all the desirable qualities with rapid onset, wide margin of safety, adequate surgical anaesthesia and has no side effects on the mother as well on the baby. Hence it can be safely used in caesarean sections.⁹

Despite increasing use of SAB, the position during initiation is still at the discretion of the anaesthesiologist. Maternal position, by influencing the spread of local anaesthetic, may affect the speed of onset of sensory block.¹⁰ The delay in positioning the parturients may affect the intrathecal distribution of local anaesthetics. Inadvertent cranial extension of sympathetic and sensory block has been reported for isobaric as well as hyperbaric local anaesthetics.¹¹ Isobaric solutions have minimal changes on vital parameters during position change.⁹ So we have conducted this randomized, single blinded study to determine the effects of spinal anaesthesia in the lateral and sitting position of the pregnant patients, following the injection isobaric levobupivacaine 0.5% into the subarachnoid space.

Aims and Objectives

To study the effects of lateral and sitting position when administering sub arachnoid block for caesarean section using plain levobupivacaine. The parameters studied included-Onset and Regression of analgesia at T10 and T6, maximum cephalad spread of analgesia, duration of sensory and motor blockade, quality of anaesthesia, Apgar score and postoperative complications if any.

Materials and Methods

After approval from the ethical committee of the institution, randomized control study was conducted at tertiary care centre between Jan. 2014-June 2015. The study included total 100 patients belonging to ASA grade I and II posted for caesarean section. The exclusion criteria included history of allergy or sensitivity to amide type local anaesthetics, altered coagulation status, infection at puncture site, multiple

pregnancy, maternal cardiac disease, suspected fetal abnormality, complicated pregnancy and all patients contraindicated for SAB.

On the day of surgery all standard monitors (NIBP, ECG, pulse oximeter) were attached. Under all aseptic precautions SAB was given in L3-L4 interspace with 25 Gzquinckes spinal needle.

The patients were randomly allocated into two groups as follows:

GROUP-L: 50 patients who received plain levobupivacaine 0.5% (2.5ml) 12.5mg in left lateral position and GROUP-S:50 patients who received plain levobupivacaine 0.5%(2.5ml) 12.5mg given in sitting position and remained in same position for 2 minutes before supine position.

Patients were slowly positioned into supine horizontal position with left lateral tilt. Surgery was started when loss of pinprick sensation to T6 was achieved. Every patient was evaluated at every 2 minutes till 15 minutes then every 5 minutes till 30 minutes and then every 15 minutes till operation was completed and thereafter every 2 hours in postoperative period by noting the vital parameters.

Parameters observed includes the onset and duration of sensory blockade was subjectively studied by pin prick method at umbilicus (T10) level,(T6) level and maximum cephalad spread also noted. Two dermatome regression, at T10 and regression to level S2 was the total duration of sensory block. The onset, duration and degree motor blockade was assessed by straight leg rising while lying supine and was graded according to modified bromage scale (mBs).¹² Onset of motor block was defined as time taken from injection of drug to achievement of mBs 3, that is inability to lift hip, knee and ankle. Duration of motor block was defined as the time taken from injection of drug to ability of patient to again move hip against gravity (mBs 0).The quality of anaesthesia was assessed depending upon the subjective feeling of pain, that patient could tolerate and need of supplemental analgesic. Conversion to general anaesthesia was considered as failure of anaesthesia.

Quality of Anaesthesia	
Excellent	Patient perceived no pain and no additional analgesia required
Good	Patient perceived mild pain that she can tolerate and noneed of supplementation
Fair	Patient perceived pain and need additional intravenous analgesia and sedation
Poor	Patient perceived severe pain and needs to be converted into general anaesthesia

Grading of APGAR score was done at 1 and 5 minutes after birth.

Results

At the end of study, the data was tabulated and the patient characteristics noted and data was subjected to statistical analysis.

Table I: Age (In years) Distribution

Age (In Years)	Groups			
	L		S	
	Number of Patients	Percentage (%)	Number of Patients	Percentage (%)
18-26	42	84.0 %	41	82.0 %
27-35	08	16.0 %	09	18.0 %
Total	50	100.0 %	50	100.0 %

The patients were in the age group between 18 and 36 years. 84% patients in group L and 82% in group S, belongs to the age group 18-26 years of age. Mean age of patients in group L was 23.38 ± 0.44 in years and 24.22 ± 0.46 in years in group S respectively. p value > 0.05 and was not significant.

Table II: Distribution of Time for Onset of Sensory block to T10 in minutes

Time of onset to T10 (In minutes)	Groups			
	L		S	
	Number of Patients	Percentage (%)	Number of Patients	Percentage (%)
1-2	00	00 %	00	00 %
3-4	45	90 %	46	92 %
5-6	05	10 %	04	08 %
Total	50	100.0 %	50	100.0 %

In group L 90% of patients had onset to T10 in 3-4 minutes and 10% had onset to T10 in 5-6 minutes. In group S 92% of patients had onset to T10 in 3-4 minutes and 8% had onset to T10 in 5-6 minutes. Onset of sensory block in group L 3.62 ± 0.09 in minutes and 3.77 ± 0.11 in minutes in group S. P value 0.341 is statistically not significant.

Table III: Two Dermatome Regression

Groups	n	Min	Max	Mean \pm S.D.	Z	P	Decision based on p-value
L	50	78	85	80.96 ± 1.75	-1.389	0.164	Non-Significant
S	50	78	85	81.44 ± 1.70			

Two dermatome regression in group L were 80.96 ± 1.75 minutes and Two dermatome regression in group S were 81.44 ± 1.70 minutes. P value 0.164 were not statistically significant.

Table IV: Regression T10 (min.)

Groups	n	Min	Max	Mean \pm S.D.	Z	P	Decision based on p-value
L	50	155	162	157.12 ± 1.73	-1.828	0.067	Non-Significant
S	50	152	163	157.92 ± 2.56			

Sensory regression to T10 in group L is 157.12 ± 1.73 minutes and Sensory regression to T10 in group S is 157.92 ± 2.56 minutes. P value obtained is 0.067 and is not statistically significant. Sensory regression to S2 in group L is 242.24 ± 1.93 minutes and Sensory regression to S2 in group S is 242.94 ± 3.48 minutes. P value obtained is 0.213 and is not statistically significant.

Table V: Motor onset (min.)

Groups	n	Min	Max	Mean \pm S.D.	Z	P	Decision based on p-value
L	50	5.12	6.45	5.747 ± 0.375	-1.674	0.094	Non-Significant
S	50	5.12	6.53	5.876 ± 0.396			

Motor onset in group L is 5.747 ± 0.375 minutes and Motor onset in group S is 5.876 ± 0.396 minutes. P value is 0.094 and is not statistically significant. Total duration of motor block in group L is 157.90 ± 3.23 minutes and in group S is 158.52 ± 2.37 minutes. P value is 0.234 and is not statistically significant.

Table VI: APGAR 1 Min. Score of Groups

Groups	APGAR Score		Total	p-value	Decision (Based on p-value)
	8	9			
L	06	44	50	0.7407	Non-Significant
S	04	46	50		
Total	10	90	100		

APGAR score at 1 minute in group L and in group S is between 8-9 and is not statistically significant. APGAR score at 5 minute in group L and in group S is and 10 is not statistically significant.

Discussion

Subarachnoid block is the anaesthesia technique of choice and is the gold standard for caesarean section. Levobupivacaine is a new long acting amide, local anaesthetic equipotent to bupivacaine⁸ and has a wide margin of safety and low cardio toxicity compared to bupivacaine. Data from non-obstetric patients cannot be directly extrapolated to obstetrics because of lower dose requirements in pregnancy. Parapaglioni¹³ using an up/down sequential allocation method determined that ED50 of levobupivacaine for a satisfactory obstetric subarachnoid block was 10.58mg. In a study conducted by Goyal et al¹⁴ fentanyl when added to isobaric levobupivacaine and hyperbaric bupivacaine in caesarean section showed shorter motor block time, decreased incidence of hypotension, bradycardia, early mobility of patients and no adverse effects on neonates.

By influencing the spread of local anaesthetic, maternal position may affect the speed of onset of sensory block.^{3,4} However studies of different maternal position have produced conflicting results.^{9,10} Park et al¹⁵ study shows that prolonged sitting posture after spinal anaesthesia using hyperbaric local anaesthetic can result in saddle block and urinary retention.

The mean onset of sensory block to T10 in group L was 3.62 min and in the group S was 3.77 min which in corroboration with the study by Vanna et al¹⁶ and Sen H et al.¹⁷ Vimolluck Sanaslipet al¹⁸ studied intrathecal isobaric compared to hyperbaric levobupivacaine 3ml 0.42% in gynecological lower abdominal surgery.

In the present study it was found that time for two dermatomal regression in group L was 80.96 min and in group S was 81.44 min. In the studies by Guler et al¹⁹ and Goyal et al¹⁴ had results comparable to our study

showing no changes in posture affects even on sensory regression time.

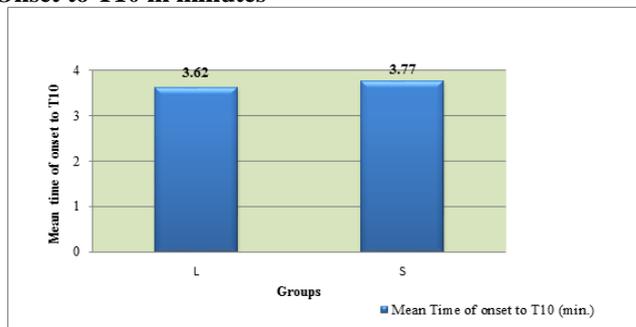
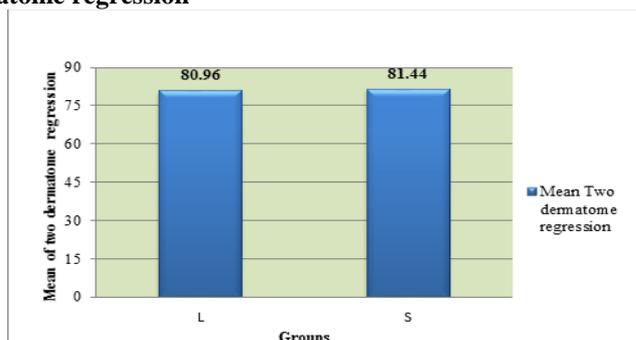
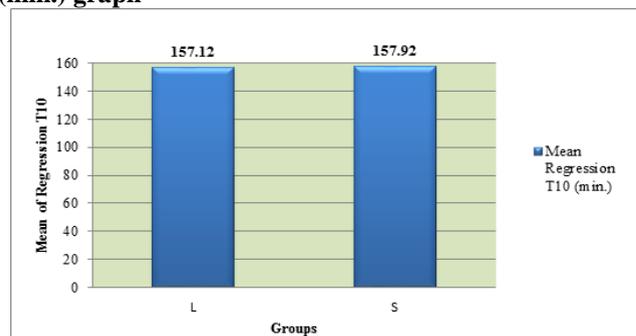
In the present study in group L mean time taken for regression to T10 was 157.12 min and in group was 157.92 min. Vimolluck Sanaslipet al¹⁸ studied intrathecal isobaric compared to hyperbaric levobupivacaine 3ml 0.42% in gynecological lower abdominal surgery, the mean time for regression to T10 for isobaric group is 160 min.

In the present study mean and SD of time of motor onset in group L is 5.747 min and in group S is 5.876 min. 'P' value is 0.094 and is not significant. Guler et al¹⁹ compared 10mg isobaric levobupivacaine and 10mg hyperbaric bupivacaine in combination with fentanyl 15mcg intrathecally in caesarean section and time taken for motor onset was 4.1min in the levobupivacaine group.

In our study in group L mean of total duration of motor block was 157.90 min and in group S was 158.52 mins. In Fabio Gori et al⁹ study mean and SD of total duration of motor block in group L was 159 minutes and mean and SD of total duration of motor block in group S was 150 minutes. 'P' value is 0.46 and was not significant and can be comparable to our study.

In our study in group L 4% of the patients had hypotension and in group S 6% of the patients had hypotension and P value was > 0.05 and is not significant. In the study Fabio gori⁹ number of patients having hypotension are 19 in supine and 17 in sitting group.

In our study none of the patients had APGAR score less than 7. In Fabio Gori⁹ study also all the patients in both sitting and lateral group APGAR score were 8-10 and which is comparable to our study.

Graph 1: Mean Time for Onset to T10 in minutes**Graph 2: Mean two dermatome regression****Graph 3: Regression T10 (min.) graph****Conclusion**

The present randomized control study concluded that 12.5mg dose of isobaric levobupivacaine 0.5% provides effective spinal anaesthesia, ensures good haemodynamic stability, excellent quality of sensory and motor block and no influence of gravity on the spread of plain levobupivacaine in sitting as well as lateral position. It can safely be used in sitting position and without fear of inadvertent extension after supine from sitting posture and block levels were distributed in a relatively narrow range with high success rate. Levobupivacaine may prove an excellent alternate to produce subarachnoid block for caesarean section.

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