

Research Article**Comparative Study of Intrathecal Bupivacaine and Levobupivacaine with Fentanyl for Caesarian Section****Prabha P.^{1*}, Shreyavathi R.², Raghavendra Rao R. S.³, Akshatha Rao⁴**^{1,2}Associate Professor, Department of Anaesthesiology, Bangalore Medical College and Research Institute, Fort, Bangalore-560002, Karnataka, India³Professor and HOD, Department of Anaesthesiology, Bangalore Medical College and Research Institute, Fort, Bangalore-560002, Karnataka, India⁴Postgraduate Student, Bangalore Medical College and Research Institute, Fort, Bangalore-560002, Karnataka, India***Corresponding author**

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Abstract: The aim of our study was to compare the effects of intrathecal administration of bupivacaine and fentanyl with levobupivacaine and fentanyl in parturients posted for elective caesarean section. Patients were allocated into two groups of 20 each. Group B received 8.75 mg of 0.5% hyperbaric bupivacaine with 12.5 mcg of fentanyl. Group L received 8.75 mg of 0.5% isobaric levobupivacaine with 12.5 mcg of fentanyl. Spinal analgesia is the most preferred anaesthetic for LSCS, since it provides easy & rapid induction, effective sensory and motor blockade and has no significant effects on the foetus. Levobupivacaine with fentanyl produces adequate levels of sensory blockade with less intensive motor blockade and also better haemodynamic stability when compared to bupivacaine with fentanyl. In conclusion 8.75 mg of 0.5% levobupivacaine combined with 12.5mcg fentanyl-prolongs the sensory blockade with slower onset and early regression of motor blockade. It also maintains stable intraoperative haemodynamic parameters and decreases the incidence of adverse effects like bradycardia, hypotension. Duration of effective analgesia was comparable to bupivacaine. Hence we opine that levobupivacaine is a good alternative to bupivacaine for spinal anaesthesia for LSCS.**Keywords:** Spinal anaesthesia, Fentanyl, Bupivacaine, Levobupivacaine

INTRODUCTION

Bupivacaine is the most popular local anaesthetic for spinal anaesthesia, in parturients undergoing elective LSCS. Bupivacaine is a long acting amide local anaesthetic with duration of action of 1 ½ -2 hours. It is marketed as racemic mixture of the S (-) and R (+) stereoisomers. R(+) component contributes to toxicity.

Levo bupivacaine is the S(-)enantiomer of bupivacaine. It is a long acting local anaesthetic, provides more selective neuraxial blockade. Clinical profile is comparable to bupivacaine and has a superior pharmacokinetic profile. It is less cardiotoxic and neurotoxic than bupivacaine [1].

Fentanyl, an opioid administered intrathecally improves the quality of sensory blockade intra-operatively without increasing sympathetic or motor blockade. It also enhances the quality and duration of post operative analgesia to a significant extent. Fentanyl has no significant adverse outcome on the neonate [2].

Aim

The aim of the study was to compare the effects of intrathecal administration of 8.75 mg of 0.5% bupivacaine and 12.5 mcg of fentanyl with 8.75 mg of 0.5% isobaric levobupivacaine and 12.5 mcg of fentanyl. The total volume was made upto 2 ml in both the groups.

Objectives

To assess:

- Maximum Cephalad spread.
- Duration of Analgesia
- Duration of Motor blockade.
- Haemodynamic parameters.
- Neonatal outcome in both the groups and to compare the results.

MATERIAL AND METHODS

This is a prospective, randomised, double blinded study. The study topic was chosen after extensive research of literature. Study was conducted at Bowring and Lady Curzon Hospitals and Vanivilas Hospital from August 2013 to November 2013. After obtaining the institutional ethical committee approval & informed

consent, 40 subjects belonging to ASA I & II were selected. Sample size was calculated with power of study at 80% and confidence interval of 95% to detect 20% variation in the duration of analgesia. Sample size required was found to be 12. For better validation of results, 20 subjects were selected in each group. 40 parturients were randomly allocated into Group B- Bupivacaine with fentanyl (N=20) and Group L- Levobupivacaine with fentanyl (N=20).

Statistical analysis was done using SPSS 20, chi square test, Fisher Exact test (nominal data) and student T test (Parametric data). Data was expressed as mean ± SD, median (range) or number of Patients (n). P value < 0.05 was considered statistically significant.

Parturients for elective LSCS, of age > 20 years, with height between 150-170 cms, weighing between 50-80 kgs and gestational age >37 weeks were included in the study. Parturients for emergency surgery, contra-indication for spinal anaesthesia, known allergy for LA/opioid and foetal indication for LSCS were excluded from the study.

All parturients were asked to fast for 8 hours preoperatively. Demographic data was recorded. Before conduct of spinal anaesthesia, all patients were preloaded with I.V. infusion of 10ml/kg Ringer lactate. Standard intra operative monitoring consisted of ECG, NIBP, Pulse oximetry and RR recording. Sub arachnoid block was performed in left lateral position at L₃₋₄ or L₂₋₃ inter space using 25 G Quincke spinal needle. Oxygen was administered through face mask.

Height of the sensory blockade achieved, time to achieve the maximum sensory blockade, duration of analgesia (regression to <L₁) time to attain Bromage 1, duration of motor blockade (regression to B0) time to rescue analgesia and APGAR score at 1 minute and 5 minute were recorded. Intra operative measurement of haemodynamic and respiratory parameters were recorded every 2 mins for the first 10 mins followed by measurement every 5 mins till the end of surgery. Any fall in SBP <90 mm Hg and HR <50/min were treated with bolus of inj. Ephedrine 6 mg IV and inj. Atropine 0.6 mg IV respectively. Sensory blockade was assessed

by bilateral loss of cold sensation and motor blockade was assessed by Bromage Scale. Neonatal outcome was assessed by the APGAR score at 1st & 5th min. Post Operatively vital signs, sensory & motor blockade assessed every 30 min for 3 hours and at 4th, 8th, 12th & 24th hours.

RESULTS

It was observed that Age, Weight & Height of subjects in Group B is comparable to subjects in Group L. The duration of surgery between Group B and L is comparable (Table 1). Intraoperative heart rate is comparable between the two groups (Fig. 1). The incidence of bradycardia was negligible. The fall in the mean arterial pressure noted in Group B is statistically significant (Fig 2) with about 30% fall in SBP noted in about 10 patients. The mean time from induction to skin incision is longer in Group L (Table 2) suggesting slower onset of action. Maximum cephalad level was variable in Group B, but it was upto T4 in all subjects in Group L (Table 3). The time for regression of sensory level to below L1 is considerably prolonged in Group L (Table 4) indicating prolonged surgical analgesia. Onset of motor block is slower in Group L as compared to group B which is of statistical significance (Table 5). A Bromage score of 3 was attained by all subjects in Group B and 12 subjects in Group L (Table 6). Motor blockade lasts for a significantly shorter duration in Group L as noted by time taken to regress to Bromage 0 (Table 7). The duration to rescue analgesia is comparable between the two groups (Table 8). All neonates had an APGAR score of > 7 at 5 min (Table 9) to conclude that both the local anaesthetics and the opioid has no adverse effect on the neonate.

Intra operative RR, SpO₂ were maintained within normal limits. Postoperative heart rate, blood pressure, RR, SpO₂ were comparable between the two groups. There was no incidence of side effects like nausea, vomiting, pruritus in either of the two groups. Post operatively the HR, BP, RR & SPO₂ were comparable between the two groups. Both SBP & DBP showed greater fall in the bupivacaine group in comparison with levobupivacaine. The HR was comparable in both the groups.

Table 1: Demographic Data

	Mean ±SD	Mean±SD
Age (Yrs)	24.05 ± 3.441	25.85 ± 4.428
Height (Cm)	160.30 ± 4.342	156.90 ± 4.930
Weight(Kg)	62.95 ± 7.215	58.90 ± 4.166
Duration of Surgery (mins)	46.75 ± 7.99	47.84 ± 9.69

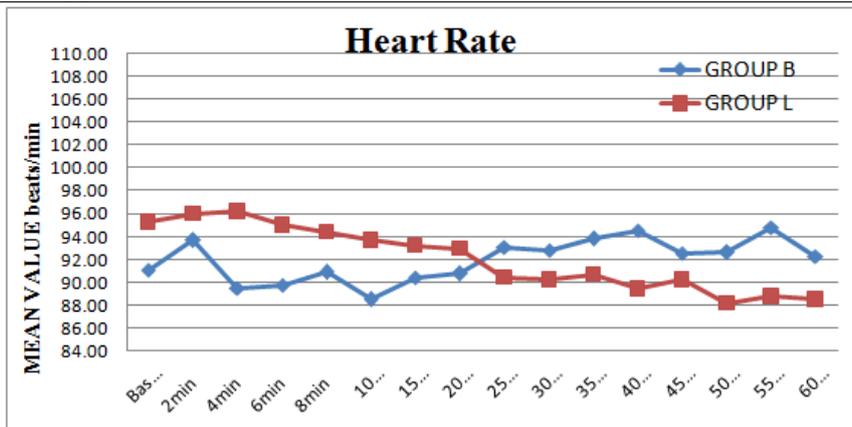


Fig.1: Intraoperative Heart rate

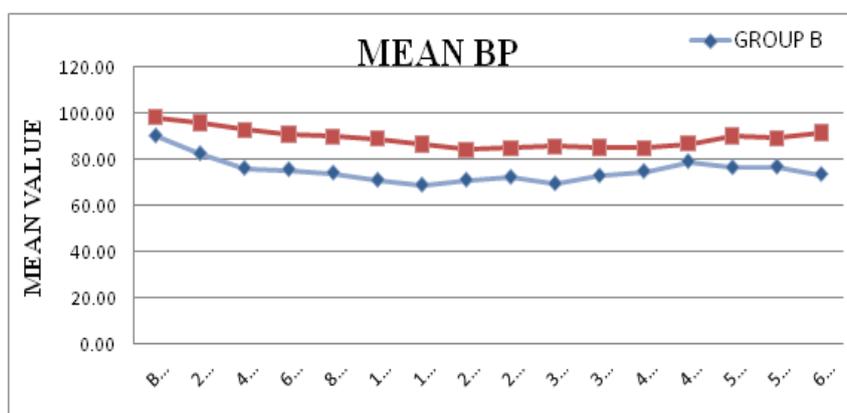


Fig. 2: Intraoperative Blood pressure

Table 2: Time for induction to skin incision

Group	Induction To Skin Incision (Min)		p-value
Group B	3.05	1.099	<0.001*
Group L	6.55	1.191	

Table 3: Height of maximum sensory block

Group	Height of Maximum Sensory Block				Total
	T2	T4	T6	T8	
Group B N (%)	4 (20%)	10 (50%)	5 (25%)	1 (5%)	20 (100%)
Group L N(%)	0 (0%)	20 (100%)	0 (0%)	0 (0%)	20 (100%)
Total	4 (10%)	30 (75%)	5 (12.5%)	1 (2.5%)	40 (100%)

Table 4: Time for regression of sensory level

	Time to regression to <L1 (Min)			p-value
	Mean	Std Deviation		
Group B	183	30.45	0.008*	
Group L	211	33.19		

Table 5: Onset of motor block

	Time to bromage 1 (Min)			p-value
	Mean	Std Deviation		
Group B	1.50	0.607	<0.001*	
Group L	3.00	1.214		

Table 6: Bromage Score

	Bromage Score		Total	p-value
	3	2		
Group B N (%)	20(100%)	0(0%)	20(100%)	0.003*
Group L N (%)	12(60%)	8(40%)	20(100%)	

Table 7: Resolution to Bromage 0

Resolution to Bromage 0 (Min)			
	Mean	Std Deviation	p-value
Group B	168.00	38.77	<0.001*
Group L	109.50	16.37	

Table 8: Request For Analgesia

Request For Analgesia (Min)			
	Mean	Std Deviation	p-value
Group B	220.25	26.23	0.33
Group L	229.25	32.83	

Table 9: APGAR Score

	APGAR Score (5 Min)		Total
	8	9	
Group B N (%)	3 (15%)	17 (85%)	20 (100%)
Group L N (%)	0 (0%)	20(100%)	20(100%)
Total	3(7.5%)	37(92.5%)	40(100%)

DISCUSSION

Regional anaesthetic techniques are one of the gold standard for caesarian section. Spinal analgesia is the most preferred anaesthetic for LSCS, since it provides easy & rapid induction, effective sensory and motor blockade and has no significant effects on the foetus. Addition of opioids hastens the onset of sensory blockade. This prolongs the duration of analgesia, without any adverse neonatal outcome.

Levobupivacaine with fentanyl produces adequate levels of sensory blockade with less intensive motor blockade and also better haemodynamic stability when compared to bupivacaine with fentanyl. Gulen Guler *et al.* concluded that since motor block time is shorter, and side effects like hypotension, bradycardia and nausea are less, the combination of levobupivacaine + fentanyl (10mg /15 mcg) can be a good alternative in cesarean sections [3].

Turkmen A *et al.* observed that time to sensory and maximum motor block was shorter in the bupivacaine + fentanyl group. A longer duration of analgesia was achieved in the levobupivacaine + fentanyl (7.5mg/ 15 mcg) group [4].

Idowu *et al.* concluded that addition of 25mcg of fentanyl to 2.5ml of 0.5% hyperbaric Bupivacaine increases the duration of analgesia [5].

L. Bouvet *et al.* found that ED95 of intrathecal Levobupivacaine for Caesarean section with 2.5mcg Sufentanil and 100 mcg Morphine was found to be 12.9mg [6].

Bremerich DH *et al.* opined that if additives are not added, then 10 mg Levobupivacaine is recommended for parturients undergoing elective caesarean section with spinal anaesthesia (7.5 mg/ 10 mg/ 12.5 mg). He also noted that Levobupivacaine showed significantly shorter and less pronounced motor blockade when compared to Bupivacaine [7, 8].

In our study, satisfactory sensory and motor blockade was achieved with 8.75 mg of bupivacaine and levobupivacaine. The time to achieve the sensory blockade as well as regression of sensory level to below L1 was longer with Group L. The duration and density of motor blockade was lesser in Group L making early ambulation possible. The incidence of hypotension and the need for bolus doses of vasopressor was significantly lesser in Group L.

CONCLUSION

In conclusion 8.75 mg of 0.5% levobupivacaine combined with 12.5mcg fentanyl-prolongs the sensory blockade with slower onset and early regression of motor blockade. It also maintains stable intraoperative haemodynamic parameters and decreases the incidence of adverse effects like bradycardia, hypotension. Duration of effective analgesia was comparable to bupivacaine. Hence we opine that levobupivacaine is a good alternative to bupivacaine for spinal anaesthesia for LSCS.

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