

Comparative Study of Epidural Ropivacaine 0.75% and Bupivacaine 0.5% with Fentanyl for Elective Caesarean Section in Andhra Pradesh Population

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Abstract

Background: Ropivacaine had clinical advantages over Bupivacaine with respect to cardiac toxicity and motor block and it was suitable for epidural caesarian section. This study was set-up to compare epidural ropivacaine with fentanyl with Bupivacaine / Fentanyl mixture in LSCS surgeries.

Method: Out of 90 patients 45 received 10 mg hyperbaric Bupivacaine with 20 microgram fentanyl and 45 (group RF) received 15 mg hyperbaric Ropivacaine with 20 microgram fentanyl Hemodynamic parameters sensory and motor blockade APGAR score were compared in both groups.

Results: Demographic profile i.e., Weight, Height BMI Duration of surgery was same in both groups ($p > 0.001$ was insignificant) were motor and sensory blockades highly significant ($p < 0.001$). VAS scores at 4 hours, 6 hours and 8 hours had significant p value ($p < 0.001$). Apgar score at 1 minute was also highly significant ($p < 0.005$).

Conclusion: In the present study it was proved that, Hyperbaric Ropivacaine with fentanyl is a better alternative to hyperbaic Bupivacaine with fentanyl in LSCS patients of c-section.

Keywords: Bupivacaine, Fentanyl, Ropivacaine, VAS analogue, Hemodynamic

Introduction

Caesarean sections are being increasingly done for maternal as well as foetal indication. The maternal indications are cephalopelvic disproportion, chorio-amnitis, non-progression or obstructed labour and previous caesarean sections. The usual foetal indications include large for gestational age foetus, unfavourable lie and foetal distress due to any cause, Lower segment caesarean section (LSCS) is routinely done under spinal anaesthesia except in cases where

either spinal anaesthesia is contraindicated such as patient refusal, injection site infections. (Severe thrombocytopenia and uncorrected hypovolemia), Regional anaesthesia is widely considered technique of choice for caesarean section and although de nova epidural anaesthesia is currently much less popular than spinal anaesthesia it is still an important technique ⁽¹⁾.

Among all solutions for providing de nova epidural anaesthesia which included mixture of

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Ropivacaine 0.75 with fentanyl and / or Bupivacaine 0.5% with Fentanyl are most popular techniques in elective caesarean section. However any mixture of Bupivacaine and Fentanyl is unlicensed and since it is not commercially available, need to be made up on an individual basis.

Ropivacaine 0.5% has been shown to be an effective agent for providing epidural anaesthesia for caesarean section providing similar satisfactory conditions to 0.5% Bupivacaine⁽²⁾ other workers used 0.75% Ropivacaine and also found it to be effective used along with fentanyl⁽³⁾⁽⁴⁾.

Bupivacaine, ropivacaine and Mepivacaine are the common drugs used for spinal anaesthesia to compare the duration of action and onset as well total duration of sensory and motor blockade and hemodynamic parameter of patients undergoing LSCS and receiving equipotent doses of Bupivacaine with fentanyl and Ropivacaine with fentanyl Maternal side effects and foetal outcomes were also studied.

Material and Methods

90 (Ninety) patients admitted at obstetrics and Gynaecology department of GSL Medical college hospital rajahmundry-533296 Andhra Pradesh were studied.

Inclusive Criteria: ASAI and ASA-II, aged 20 to 45 years patients willing to undergo elective LSCS were selected for study.

Exclusion Criteria: Patients ASA III not willing to undergo LSCS surgery, women who had undergone previous surgery, scoliosis, or injury to back patients who has allergy to amide local anaesthetics. Women history of still born babies was excluded from the study.

Method: Every patient was premedicated with oral Ranitidine 150 mg and metaclopromide 10 mg on arrival in the theatre suite they were given 25ml of 0.3 M sodium citrate orally. Out 90, 40 patients were classified in two groups.

Group BF - Received 10 mg hyperbaric bupivacaine with 20 microgram Fentanyl.

Group RF - Received 15mg hyperbaric Ropivacaine with 20 microgram Fentanyl.

Basic investigations such as CBC, Coagulation profile, HbsAg, and HIV were done in all cases if not already done. After shifting to operation theatre venous access was secured with 20 G intracath and 500 ml ringer lactate was started. ECG monitoring SPO2 and non-invasive blood pressure monitoring was started. Spinal anaesthesia was given using standard practice. All patients received 500 ml Ringer lactate and first dosage of third generation cephalosporin before giving spinal anaesthesia. Patients either received Bupivacaine and Fentanyl or Ropivacaine and Fentanyl depending upon the group they belonged. The onset and duration of analgesic were noted. Hemodynamic parameters such as HR (Heart rate), systolic as well as diastolic pressure respiratory rate and SPO2 were monitored APGAR score at 1 minute and 5 minute was analysed to know immediate neonatal outcomes. VAS (visual analogue scale) was determined every 5 minutes than every 30 minutes up to 5 hours to assess the severity of post-operative pain. The incidence of complication such as hypotension, bradycardia nausea, vomiting and shivering was noted.

Duration of study was August-2019 to November-2022

Statistical analysis: Demographic profiles motor and sensory blockade VPS score APGAR score were compared in both groups with z test. The statistical analysis was carried out SPSS software.

Observation and Results

Table-1: Comparison of demographics profile in both groups

- Weight (Kg) - 61.30 (\pm 5.20) in group-B, 59.12 (\pm 6.28) in group-R, t test was 1.71 and $p > 0.95$
- Height (Cm) - 152.59 (\pm 5.24) in group-B, 154.21 (\pm 4.50) in group-R, t test was 0.19 and $p > 0.84$
- BMI - 24.09 (\pm 1.52) in group-B, 24.30 (\pm 1.60) in group-R, t test was 0.63 and $p > 0.52$
- Duration of surgery (Minutes) - 58.10 (\pm 6.10) in group-B, 56.18 (\pm 4.90) in group-R, t test was 1.61 and $p > 0.9$

Table-2: Comparison of motor and sensory blockades in both groups

- Onset of sensory Block (seconds) – 152.6 (\pm 15.30) in group-B, 186 (\pm 20.14) in group-R, t test was 8.15 and $p < 0.001$
- Mean time to achieve highest level of sensory analgesia (sec) – 333.30 (\pm 24.5) in group-B, 382.66 (\pm 26.8) in group-R, t test was 9.11 and $p < 0.001$
- Onset of motor Block (sec) – 322.4 (\pm 28.11) in group-B, 360.52 (\pm 36.22) in group-R, t test was 5.5 and $p < 0.001$
- Mean time to sensory regression (minutes) – 132.5 (\pm 10.16) in group-B, 98.10 (\pm 9.30) in group-R, t test was 16.8 and $p < 0.001$
- Duration of motor Block (Minutes) – 180.06 (\pm 20.6) in group-B, 122.6 (\pm 14.40) in group-R, t test was 15.3 and $p < 0.001$
- Duration of analgesia (Minutes) – 276.88 (\pm 40.34) in group-B, 182.66 (\pm 30.10) in group-R, t test was 12.5 and $p < 0.001$

Table-3: Comparison of VAS score in both groups

- At 180 Minutes – 1.20 (\pm 0.40) in group-B, 1.34 (\pm 0.53) in group-R, t test was 1.33 and $p > 0.18$
- At 4 hours – 2.10 (\pm 0.62) in group-B, 2.90 (\pm 0.70) in group-R, t test was 5.7 and $p < 0.001$
- At 6 hours – 4.10 (\pm 0.42) in group-B, 4.62 (\pm 0.44) in group-R, t test was 5.73 and $p < 0.001$
- At 8 hours – 5.10 (\pm 1.10) in group-B, 5.32 (\pm 1.34) in group-R, t test was 0.85 and $p > 0.68$

Table 4: Comparison of APGAR score in both groups

- APGAR at 1 minute – 8.8 (\pm 0.44) in group-B, 9.05 (\pm 0.48) in group-R, t test was 2.5 and $p < 0.005$
- APGAR at 5 minute – 9.28 (\pm 0.40) in group-B, 9.32 (\pm 0.53) in group-R, t test was 0.40 and $p > 0.68$

Table 1: Comparison of Demographic profile in both groups

Total No. of patients: 90

Particulars	Group-B Mean value \pm SD 45	Group-R Mean value \pm SD 45	t test	p value
Weight (Kg)	61.30 (\pm 5.20)	59.22 (\pm 6.28)	1.71	$p > 0.95$
Height (cm)	152.59 (\pm 5.24)	154.21 (\pm 4.500)	0.19	$p > 0.04$
BMI	24.09 (\pm 1.52)	24.30 (\pm 1.60)	0.63	$p > 0.52$
Duration of surgery (minutes)	58.10 (\pm 6.10)	56.18 (\pm 1.90)	1.6	$p > 0.9$

Table 2: Comparison of Motor and sensory blockades in both groups

Parameters	Group-B Mean value \pm SD (45)	Group-R Mean value \pm SD (45)	t test	p value
Onset of sensory blockades	152.6 (\pm 15.30)	186.39 (\pm 20.14)	8.15	$P < 0.001$
Onset motor Block (seconds)	322.4 (\pm 28.10)	360.52 (\pm 36.22)	5.57	$P < 0.0001$
Mean time to achieve highest level of sensory Analgesia (sec)	333.30 (\pm 24.52)	382.66 (\pm 26.80)	9.11	$P < 0.001$

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Parameters	Group-B Mean value ± SD (45)	Group-R Mean value ± SD (45)	t test	p value
Mean time to sensory regression(Minutes)	132.52 (± 10.16)	98.10 (± 9.30)	16.8	P<0.001
Duration of motor Block (Minutes)	180.00 (± 20.60)	122.6 (± 14.40)	15.3	P<0.001
Duration of Analgesia (Minutes)	276.88 (± 40.34)	182.66 (± 30.12)	12.5	P<0.001

Table 3: Comparison of Mean VAS scores in both groups

Time	Group-B (45)	Group-R (45)	t test	p value
Immediate post-operative period	00	00	--	--
30 Minutes	00	00	--	--
60 Minutes	00	00		
90 Minutes	00	00		
120 Minutes	00	00		
150 Minutes	00	00		
180 Minutes	1.20 (± 0.40)	1.34 (± 0.53)	1.8	P<0.18
4 Hours	2.10 (± 0.62)	2.90 (± 0.70)	5.7	P<0.001
6 hours	4.10 (± 0.42)	4.62 (± 0.44)	5.73	P<0.001
8 hours	5.10 (± 1.10)	5.32 (± 1.34)	0.85	p>0.89

Table 4: Comparison of Mean APGAR scores in both groups

APGAR	Group-B (45)	Group-R (45)	t test	p value
APGAR at 1 minutes	8.8 (± 0.44)	9.05 (± 0.48)	2.5	P<0.005
APGAR at 5 minutes	9.28 (± 0.40)	9.32 (± 0.53)	0.40	P>0.68

Discussion

Present comparative study of epidural ropivacaine 0.75% and Bupivacaine 0.5% with Fentanyl for elective caesarean section in Andhra Pradesh Population.

The demographic parameters like weight, height BMI and duration surgery remained same in both studies (p>0.001 was Insignificant) (Table-1). Onset of sensory block (in seconds), onset of motor block

(in seconds) Mean time to achieve highest level of sensory analgesic (in seconds) Mean time to sensory regression (minutes), duration of analgesia (minutes) had highest p values in every parameter ($p < 0.001$) (Table-2). Comparison of VAS score in both group (B and R) at 4 hours, 6 hours and 8 hours had highly significant p value ($p < 0.001$) (Table-3). In comparison of Mean APGAR scores in both group at 1 minute had highly significant p value ($p < 0.001$) (Table-4). These findings are more or less in agreement with previous studies ⁽⁵⁾⁽⁶⁾⁽⁷⁾.

Though Bupivacaine has been the very popular anaesthetic agent for various surgeries, for its long acting local anaesthetic profile. Its use however associated with side effects including central nervous system and neurotoxicity ⁽⁸⁾. Ropivacaine is better in comparison to Bupivacaine because of its least side effects like retention of urine bradycardia and hypotension. Moreover Ropivacaine is less lipophilic as compare to Bupivacaine hence it does not penetrate large myelinated causing a reduced motor blockade and least neurotoxicity but Ropivacaine is equally effective analgesic as Bupivacaine⁽⁹⁾. Hence Ropivacaine is being preferred over Bupivacaine for various surgeries.

Ropivacaine is potentially superior agent to Bupivacaine because of its lower toxicity and less motor block. Experiment in lower animals have also reported that, Ropivacaine is less cardiotoxic than Bupivacaine Ropivacaine produces fewer arrhythmias than Bupivacaine in the isolated perfused rabbit heart ⁽¹⁰⁾. The same study of comparison of Ropivacaine, fentanyl with Bupivacaine plus fentanyl was conducted by many authors and noted that, there was no any significant changes in hemodynamic parameters VAS scores except low diastolic pressure at 360 minutes in group R (Ropivacaine group) and no adverse effects like Nausea vomiting and hypotension were observed in R group ⁽¹¹⁾.

In the present study it was observed that sensory block was shorter in the Ropivacaine group than Bupivacaine group. Moreover Ropivacaine also produced shorter duration of motor blockage than Bupivacaine but haemodynamic parameters such as systolic and diastolic blood pressure has no any significant difference but HR of patients in Bupivacaine group was higher than the Ropivacaine

group. Hence Ropivacaine is better choice due to little influence on hemodynamic and shorter duration of sensory block and motor block which are useful for the recovery and also safe to the patients ⁽¹²⁾.

Bupivacaine being neurotoxic its groups patients has more nausea / vomiting bradycardia, hypotension was observed which causes panic in patients and worry for anaesthesiologist.

Summary and Conclusion

Present comparative study of epidural Ropivacaine 0.75% and Bupivacaine with fentanyl for elective caesarean section in Andhra Pradesh population. It was observed that, Ropivacaine is better alternative to Bupivacaine because of its least neuro and cardiotoxic side effects. Moreover Ropivacaine has shorter duration of sensory and motor blockage.

The present study demands such clinical trials in large number of patients to confirm the significant findings of present study.

Limitation of Study: Owing to tertiary location of research centre, small number of patients and lack of latest technologies we have limited findings and results.

This research work was approved by Ethical committee of GSL Medical College Rajahmundry-533296, Andhra Pradesh.

Conflict of Interest: No

Funding: No

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