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Original Research Article

Comparative Study of Spinal Ropivacaine 0.75% with Fentanyl and Bupivacaine 0.5% with Fentanyl for Elective Caesarean Section in Telangana Population

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Abstract:

Background: The analgesic efficacy of three different spinal solutions (Ropivacaine, bupivacaine, and Fentanyl) was compared for elective caesarean sections.

Method: Out of 80 patients, 40 received 10 mg of hyperbaric bupivacaine with 20 micrograms of fentanyl, and 40 patients (group RF) received 15 mg of hyperbaric ropivacaine with 20 micrograms of fentanyl. Hemodynamic parameters and the sensory and motor blockage, APGAR score were compared in both groups.

Results: Demographic profile, i.e., parameters, i.e., weight, height, BMI, duration of surgery was same in both the groups, hence the p value was insignificant ($p>0.001$) but the comparative study of motor and sensory blockades had a highly significant p value ($p<0.001$). VAS scores at different intervals of 4 hours, 6 hours, and 8 hours had significant p values ($p<0.001$). The Apgar score at 1 minute was also highly significant ($p<0.001$).

Conclusion: The present pragmatic study proved that, hyperbaric ropivacaine with fentanyl is an ideal alternative to hyperbaric bupivacaine with fentanyl in patients undergoing cesarean sections.

Keywords: Hyperbaric, Bupivacaine, Ropivacaine, Cesarean Section, Hemodynamic, APGAR score, Telangana.

Introduction

Effective acute post-operative pain relief after major abdominal surgery leads to cardiovascular stability, patient satisfaction, early mobilisation, early enteral feeds, and a reduced hospital stay. Both spinal ropivaccine and bupivacaine can be used for this purpose individually or in combination with opioids [1,2].

Material and Methods

80 (eighty) patients admitted to the obstetrics and gynaecology department of the CMR Institute of Medical Sciences, Kandlakoya Village, Medchal Road, Hyderabad-501401, Telangana State, were studied.

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

Exclusion Criteria: Patients in ASA III, not willing to undergo LSCS surgery, women who have undergone previous surgery, scoliosis, or injuries to the back

and patients who are allergic to amide local anaesthetics, women with history of stillborn babies were excluded from the study.

Method: Every patient was premedicated with oral Ranitidine 150 mg and metaclopromide 10 mg. On arrival into the theatre suite, they were given 25 ml of 0.3 M sodium citrate orally. Out of 80 patients, 40 were classified into two groups.

Group BF – Received 10 mg of hyperbaric bupivacaine with 20 micrograms of fentanyl.

Group RF – Received 15 mg of hyperbaric ropivacaine with 20 micrograms of fentanyl.

Basic investigations such as CBC, coagulation profile, HbsAg, and HIV were done in all cases if not already done. After shifting to the operating theatre, venous access was secured with a 20-G intracath and were preloaded with 500 ml of ringer lactate solution. ECG monitoring, SpO2 measurement and non-invasive blood pressure monitoring were started.

Spinal anaesthesia was given using standard practise. All patients received 500 ml of Ringer lactate and the first dose of third generation cephalosporin before spinal anaesthesia. Patients either received bupivacaine and fentanyl or ropivacaine and fentanyl, depending on the group to which they belonged to. The onset and duration of analgesia were noted. Hemodynamic parameters such as HR (heart rate), systolic as well as diastolic blood pressure, respiratory rate, and SpO2 were monitored. APGAR scores at 1 minute and 5 minutes were analysed to determine immediate neonatal outcomes. VAS (visual analogue scale) was determined every 5 minutes, every 30 minutes, and up to 5 hours to assess the severity of post-operative pain. The incidence of complications such as hypotension, bradycardia, nausea, vomiting, and shivering was noted.

Statistical analysis:

Demographic profiles of motor and sensory blockades, VAS score and APGAR score were compared in both the groups with the z test. The statistical analysis was carried out using SPSS software.

Observation and Results

Table-1: Comparison of demographics profile in both groups-

- Weight (Kg) – 62.32 (± 5.16) in group-B, 60.20 (± 6.26) in group-R, t test was 1.65 and $p>0.10$
- Height (Cm) – 152.57 (± 5.25) in group-B, 154.20 (± 4.18) in group-R, t test was 1.49 and $p>0.12$
- BMI – 24.08 (± 1.50) in group-B, 24.28 (± 1.58) in group-R, t test was 0.58 and $p>0.56$
- Duration of surgery (Minutes) – 58.12 (± 6.8) in group-B, 56.20 (± 4.92) in group-R, t test was 1.71 and $p>0.009$

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

- Onset of sensory Block – 150.4 (± 14.28) in group-B, 187.37 (± 20.12) in group-R, t test was 8.96 and $p<0.001$
- Onset of motor Block (sec) – 320.2 (± 27.8) in group-B, 362.50 (± 35.20) in group-R, t test was 5.96 and $p<0.001$
- Mean time to achieve highest level of sensory analgesia (in seconds) – 331.28 (± 23.50) in group-B, 380.54 (± 28.79) in group-R, t test was 8.94 and $p<0.001$
- Mean time to sensory regression (minutes) – 130.50 (± 9.14) in group-B, 99.12 (± 9.28) in group-R, t test was 15.2 and $p<0.001$
- Duration of motor Block (Minutes) – 182.00 (± 20.58) in group-B, 123.5 (± 12.38) in group-R, t test was 15.4 and $p<0.001$
- Duration of analgesia (Minutes) – 274.86 (± 38.3) in group-B, 180.64 (± 28.14) in group-R, t test was 12.5 and $p<0.001$

Table-3: Comparison of VAS score in both groups –

- At 180 Minutes – 1.22 (± 0.38) in group-B, 1.36 (± 0.55) in group-R, t test was 1.03 and p>0.32
- At 4 hours – 2.12 (± 0.60) in group-B, 2.92 (± 0.68) in group-R, t test was 1.32 and p<0.19
- At 6 hours – 4.12 (± 0.40) in group-B, 4.64 (± 0.42) in group-R, t test was 5.67 and p<0.001
- At 8 hours – 5.12 (± 1.8) in group-B, 5.34 (± 1.32) in group-R, t test was 0.62 and p>0.53

Table-4: Comparison of APGAR score in both groups

- APGAR at 1 minute – 8.6 (± 0.42) in group-B, 9.4 (± 0.46) in group-R, t test was 8.12 and p<0.001 p value is highly significant
- APGAR at 5 minute – 9.26 (± 0.42) in group-B, 9.30 (± 0.55) in group-R, t test was 0.36 and p>0.71.

Table 1: Comparison of Demographic profile in both groups (Total No. of patients: 80)

Demographic profile	Group-B Mean value ± SD 40	Group-R Mean value ± SD 40	t test	p value
Weight (Kg)	62.32 (± 5.16)	60.20 (± 6.26)	1.65	p>0.10
Height (cm)	152.57 (± 5.23)	154.20 (± 4.48)	1.49	p>0.10
BMI	24.08 (± 1.50)	24.28 (± 1.58)	0.58	p>0.56
Duration of surgery (minutes)	58.12 (± 6.8)	56.20 (± 1.92)	1.71	p>0.9

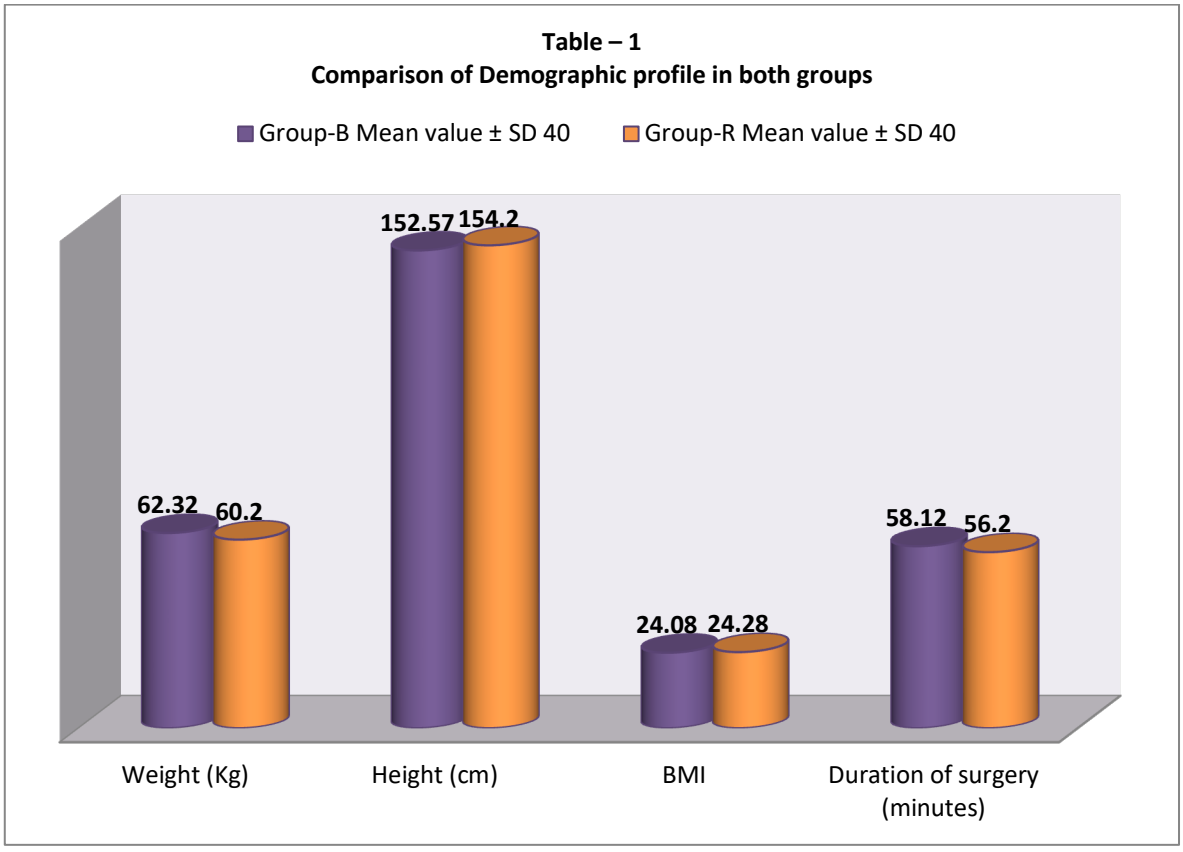

Figure 1:

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

Details	Group-B Mean value ± SD (40)	Group-R Mean value ± SD (40)	t test	p value
Onset of sensory blockades	150.4 (± 14.28)	185.37 (± 20.12)	8.96	P<0.001
Onset motor Block (seconds)	320.2 (± 27.8)	362.50 (± 35.20)	5.96	P<0.001
Mean time to achieve highest level of sensory Analgesia (sec)	331.28 (± 23.50)	380.64 (± 25.79)	8.94	P<0.001
Mean time to sensory regressive (Minutes)	130.50 (± 9.14)	99.12 (± 9.28)	15.2	P<0.001
Duration of motor Block (Minutes)	182.00 (± 20.58)	123.5 (± 12.38)	15.4	P<0.001
Duration of Analgesia (Minutes)	274.86 (± 38.33)	180.64 (± 28.14)	12.5	P<0.001

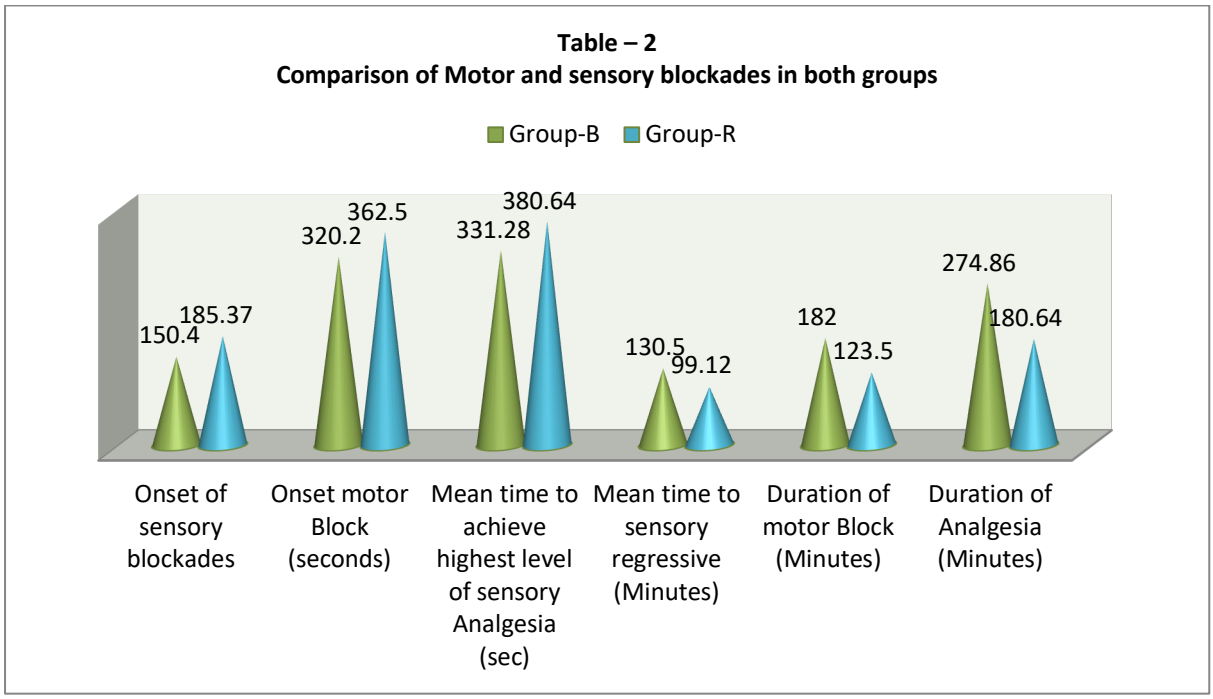

Figure 2:

Table 3: Comparison of Mean VAS scores in both groups

Time	Group-B (40)	Group-R (40)	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	1.22(± 0.38)	1.36(± 0.55)	1.03	P<0.32
4 Hours	2.12(± 0.60)	2.92(± 0.68)	1.32	P>0.19
6 hours	4.12(± 0.40)	4.64(± 0.42)	5.67	P<0.001
8 hours	5.12(± 1.8)	5.34(± 1.32	0.62	p>0.534

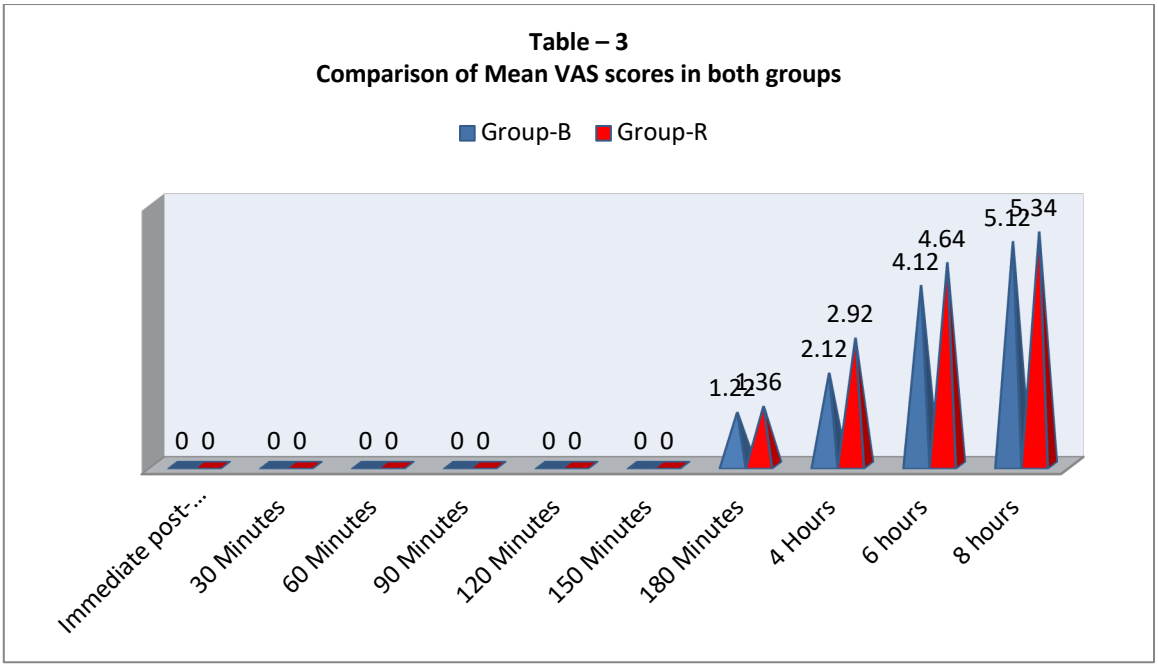

Figure 3:

Table 4: Comparison of Mean APGAR scores in both groups

APGAR	Group-B(40)	Group-R(40)	t test	p value
APGAR at 1 minutes	8.6(± 0.42)	9.4(± 0.46)	8.12	P<0.001
APGAR at 5 minutes	9.26(± 0.42)	9.30(± 0.55)	0.366	P>0.71

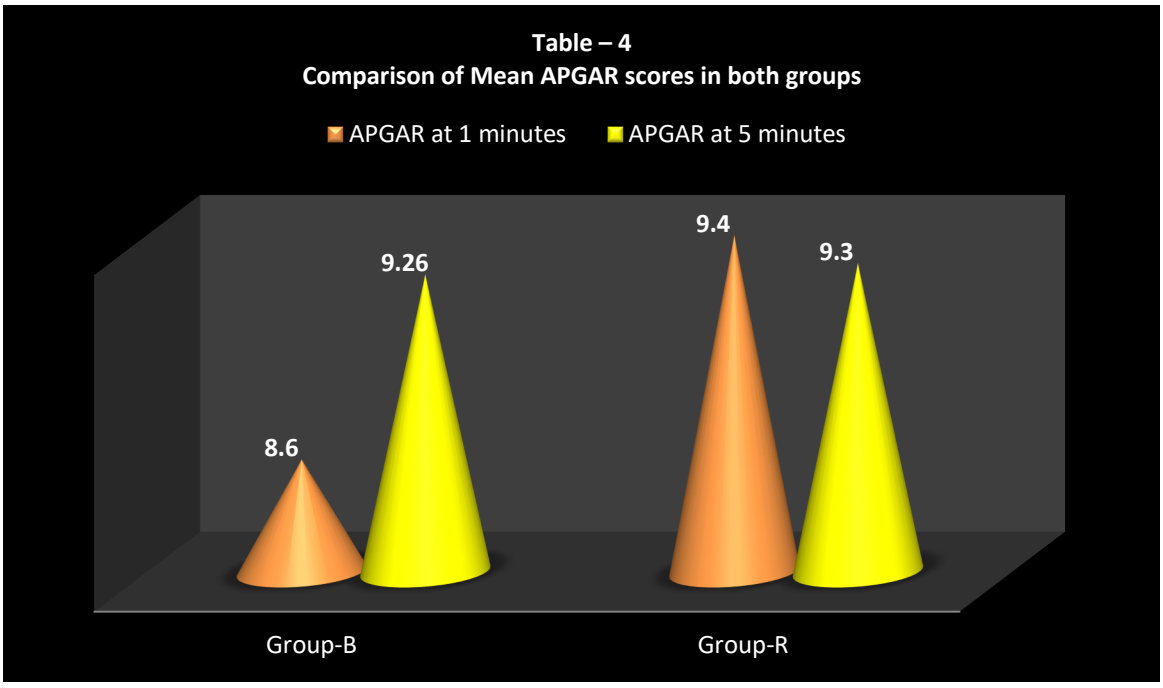

Figure 4:

Discussion

Present is a comparative study of spinal ropivacaine 0.75% and bupivacaine 0.5% with fentanyl for elective surgery in the Telangana population. The demographic profile of weight, height, and BMI were same in both the groups, hence the p value was insignificant (p>0.001) (Table-1). In the comparative study of motor and sensory blockades, – onset of sensory blockades,

onset of motor block, mean time to achieve the highest level of sensory anaesthesia, mean time for sensory regression, duration of motor block, and block duration had the highest significant p values ($p<0.001$) (Table-1). In the comparative study of motor and sensory blockades, onset of sensory blockades, onset of motor block, mean time to achieve height, and sensory anaesthesia, mean time for sensory regression, duration of motor block, and duration of analgesia had highly significant p values ($p<0.001$) (Table-2). VAS scores at different intervals of 4 hours, 6 hours, and 8 hours had significant p values ($p<0.001$) (Table-3). APGAR scores at 1 minute also had a highly significant p value ($p<0.001$) (Table-4). These findings are more or less in agreement with previous studies [5,6,7].Bupivacaine has been the very popular anaesthetic agent for various surgeries because of its long acting local anaesthetic profile. Its use, however, is associated with side effects including cardiovascular and neurotoxicity [8].

Ropivacaine is better in comparison to bupuvacaine because of its fewer side effects, like retention of urine, bradycardia, and hypotension. Moreover, Ropivacaine is less lipophilic as compared to Bupivacaine; hence, it does not penetrate large myelin, causing a reduced motor blockade and the least neurotoxicity, but Ropivacaine is an equally effective analgesic as Bupuvacaine [9]. Hence, ropivacaine is being preferred over Bupivacaine for various surgeries.

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

In the present study, it was observed that sensory block was shorter in the Ropivacaine group than the Bupivacaine group. Moreover, Ropivacaine also produced a shorter duration of motor blockage than Bupivacaine, but hemodynamic parameters such as systolic and diastolic blood pressure showed no significant difference, but the HR of patients in the Bupivacaine group was higher than the Ropivacaine group. Hence, ropivacaine is a better choice due to its little influence on hemodynamics and shorter duration of sensory and motor blocks, which are useful for the recovery and also safe for the patients [12].

Bupivacaine being cardiotoxic, its groups of patients had more nausea, vomiting, bradycardia, and hypotension, which caused panic in patients and worry for anaesthesiologists.

Summary and Conclusion

Present a comparative study of spinal Ropivacaine 0.75% and Bupivacaine with fentanyl for elective caesarean section in the Telangana population. It was observed that Ropivacaine is a better alternative to Bupivacaine because of its fewer neurotoxic and cardiotoxic side effects. Moreover, ropivacaine has a shorter duration of sensory and motor blockage.

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

Limitation of study – Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and research.

- This research paper was approved by the ethical committee of the CMR

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