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ORIGINAL ARTICLE

COMPARISON OF ROPIVACAINE (0.75%) AND BUPIVACAINE (0.5%) FOR EPIDURAL ANAESTHESIA IN PATIENTS POSTED FOR ELECTIVE LOWER ABDOMINAL AND EXTREMITY SURGERY

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ABSTRACT: Regional anaesthesia is becoming one of the most useful and versatile procedures in modern anesthesiology. Bupivacaine is a long acting amide local anaesthetic which is widely used since years, but it is associated with a many side effects like Central Nervous System (CNS) toxicity and cardiotoxicity. Ropivacaine is a newly introduced long acting amide local anaesthetic drug in India which has been developed as a possible alternative to Bupivacaine. It has a lower lipophilicity than bupivacaine and hence associated with a decreased potential for CNS and cardiotoxicity. **AIMS:** The aim of the study was to compare the time of onset of sensory block and duration of sensory and motor blockade, duration of analgesia of epidural anaesthesia produced by bupivacaine 0.5% and ropivacaine 0.75% for lower abdominal & limb surgery. **METHODS:** A prospective randomised study 60 patients, aged between 18-60 years, ASA 1 and 2, undergoing various lower abdominal & limb surgeries were randomly allocated to 2 groups of 30 each. Group B received 15ml of 0.5% bupivacaine and group R received 15 ml of 0.75% bupivacaine epidurally. The time of onset of sensory, intensity of motor block, duration of sensory and motor block and hemodynamic changes were assessed. **RESULTS:** The time of onset and duration of sensory block was comparable for both the drugs. Bupivacaine 0.5% produced more intensity and longer duration of motor block than ropivacaine 0.75%. Both the drugs were comparable with respect to hemodynamic changes. **CONCLUSION:** Epidural ropivacaine 0.75% can be safely used as a possible alternative to bupivacaine 0.5% in lower abdominal and extremity procedures.

KEYWORDS: Ropivacaine, Bupivacaine, Epidural.

INTRODUCTION: Importance in the use of regional anaesthesia has increased in recent years. Regional anaesthesia for central neuraxial blockade, as well as blockade of the peripheral nerves and plexus has become a vital part of the present clinical practice of anaesthesiologist. However, toxicity issues have tarnished the history of regional anaesthesia and although great improvements have been made, they continue to be important hindrances.[1]

Bupivacaine, a highly lipophilic long-acting local anaesthetic has been the most commonly used anaesthetic agent in its class to date. Unfortunately, like all amide-type anaesthetics, Bupivacaine has been associated with high degree of cardiac and local toxicity. An important aspect of this toxicity is that it involves stereo specificity, with the S(-) enantiomer showing significantly less cardio depressant effects than the R(+) enantiomer.

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Based on investigations of the aetiological mechanisms of local anaesthetic induced cardio toxicity, the search for less toxic alternatives to Bupivacaine was concentrated, an amide linked agents comprised of a single enantiomer. As a result of these efforts, the long acting local anaesthetic Ropivacaine was found, which has been recently introduced in India[2].

Ropivacaine is a long acting local anaesthetic that is structurally related to Bupivacaine. Ropivacaine represents the monohydrate of the hydrochloride salt of 1-propyl-2, 6-pipecoloxylidide.[3] Ropivacaine has similar potency to Bupivacaine at doses higher than the ED50 for pain relief. The potency of Ropivacaine may be altered by co-administration with other anaesthetics or analgesics.[4]

This prospective clinical trial is intended to compare the efficacy and safety of Ropivacaine with Bupivacaine in epidural anaesthesia.

MATERIAL & METHODS: A randomised prospective clinical study of patients undergoing elective lower abdominal and extremity surgeries receiving either epidural Ropivacaine or Bupivacaine was undertaken after obtaining written informed consent and institutional ethical committee approval.

60 patients divided into two groups of 30 by prospective randomisation method, Group R to receive 15 ml of 0.75% Ropivacaine and Group B to receive 15 ml of 0.5% Bupivacaine.

We included adult patients aged between 18 and 60 years of both sexes of American Society of Anaesthesiologists (ASA) physical status Grade I and II for the study. Exclusion criteria included known allergy to local anaesthetics, local infections, coagulopathy, mental illness, and patients on ant arrhythmic treatment. All patients were of average Indian height and weight.

After pre anaesthetic checkup, patients were kept fasting from previous night and premedicated with tablet Alprazolam 0.5mg and Tablet Ranitidine 150mg. Intravenous line obtained with 18G cannula and preloaded with RL 500ml half an hour before anaesthesia.

Basal Vital parameters like heart rate, blood pressure, SPO2 were noted. Patients are placed in sitting position. Epidural space was identified with loss of resistance to air technique using 18G Tuohy epidural needle at L2-3/L3-4 level. An Epidural catheter was advanced in cephalad direction into the epidural space and was fixed in the space for3-5 cms. Test dose of 3ml of 2% lignocaine with adrenaline (1; 200000) will be given after negative aspiration of CSF and blood. After confirming the correct position of the catheter, patient was turned to supine position. Five minutes after test dose, in the absence of any adverse sequale, 15 ml of study drug as per randomization was given through the catheter.

Following parameters were used to assess the quality of Epidural anaesthesia.

Efficacy Parameters:

1. Onset of Block (action)-at the level of L1.
2. Onset of surgical sensory block: Maximum level of blockade, Onset of analgesia, level – level of analgesia checked by loss of pin prick sensation (27G hypodermic needle) in the innervations areas of dermatomes at0,2, 5,10,20,30 min and there after every 10 minutes until sensory block is resolved.
3. Onset of motor block: Regarding block intensity, block onset, block duration, using rating scale (Modified Bromage Scale and graded as 0: No motor paralysis, 1: Inability to raise

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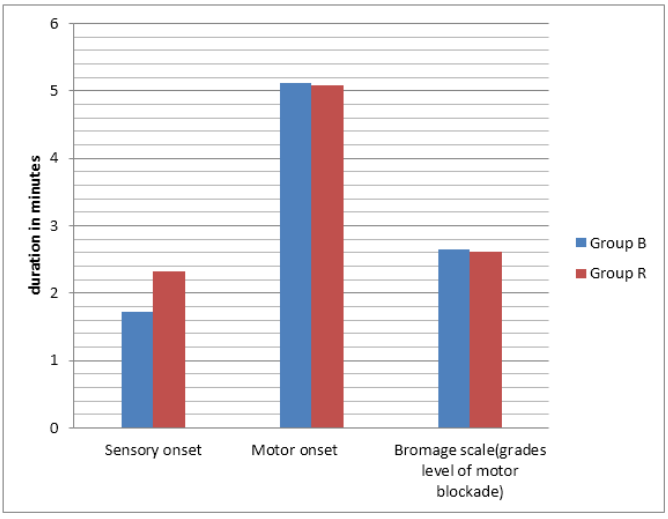
extended leg, 2: Inability to flex knee, 3: Inability to flex ankle). Time for onset of motor block (time from epidural injection to the time Bromage Grade 0 changed to Grade 1), maximum motor block and complete motor recovery noted. Patients were monitored for intraoperative events like hypotension, bradycardia, shivering, nausea and vomiting and followed-up for 24 h for any postoperative complications. The quality of analgesia was assessed by time to rescue analgesia.

RESULTS: Demographic profiles, mean duration of surgery, the types of surgeries and mean time for onset of sensory and motor block was comparable.

Variable (Min)	Group B	Group R	P value
Sensory onset	1.72±1.09	2.32±1.05	0.036
Motor onset	5.12±2.35	5.08±2.58	0.916
Bromage scale(grades level of motor blockade)	2.65±0.48	2.61±0.47	0.796
Maximum motor Blockade	22.36±7.46	28.77±8.69	0.009**
Duration of analgesia	205.90±39.36	221.17±49.49	0.269
Duration of motor block	182.99±37.11	181.33±39.81	0.857

Sensory and Motor Characteristics

The mean time of onset of sensory blockade in group B was 1.72±1.09 mins and group R was 2.32±1.05 mins. Onset of sensory blockade was clinically faster in group B. The onset of motor blockade in group B was 5.12±2.35mins and in group R was 5.08±2.58 mins. This was clinically and stastically not significant. Whereas the time for maximum motor blockade in group B was 22.36±7.46 mins and in group R was28.77±8.69 mins which was clinically and stastically significant with p value of 0.009. The mean duration of analgesia in group B was 205.90±39.36 mins and group R was 221.17±49.49 mins. The duration of motor block in group B was 182.99±37.11 mins and group R was 181.33±39.81mins.



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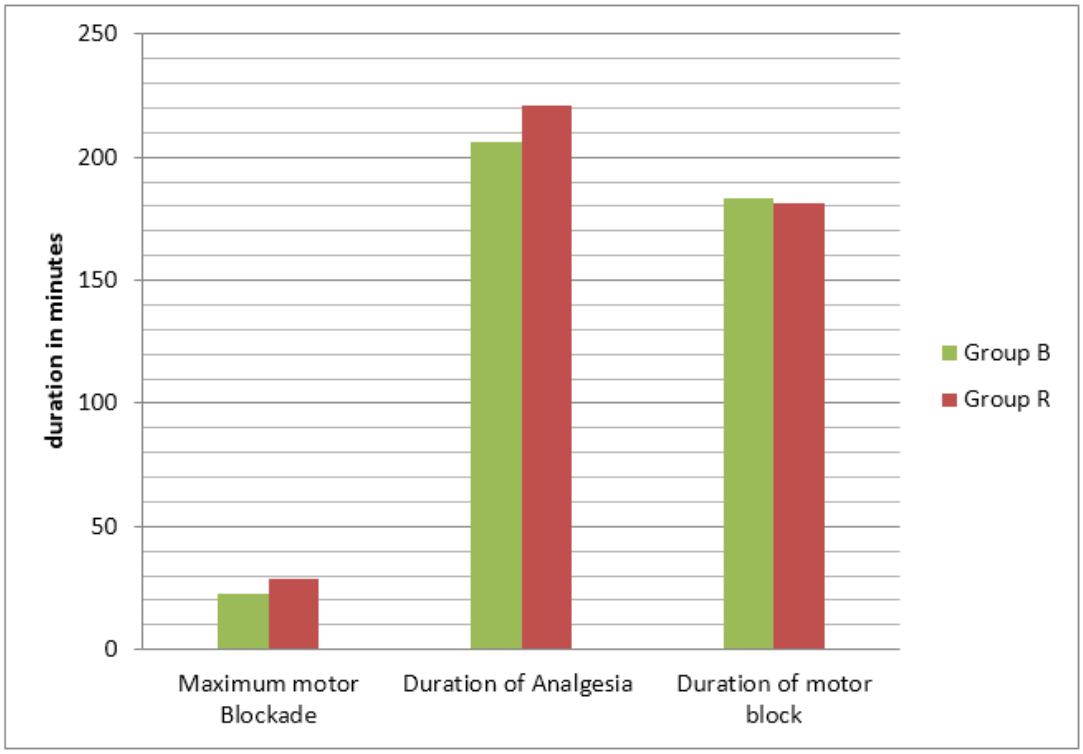

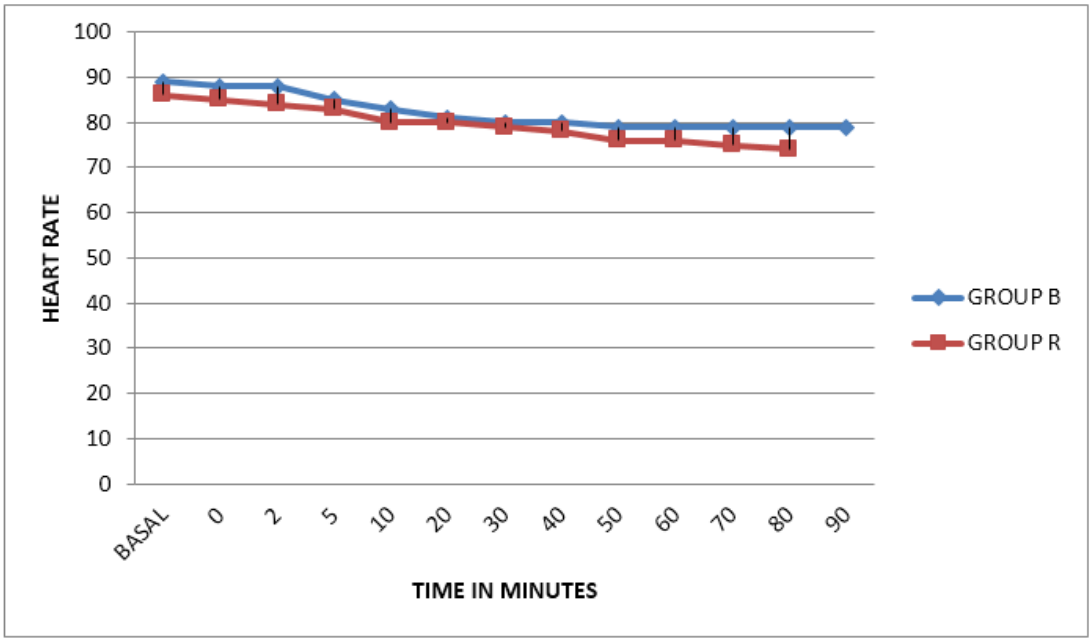

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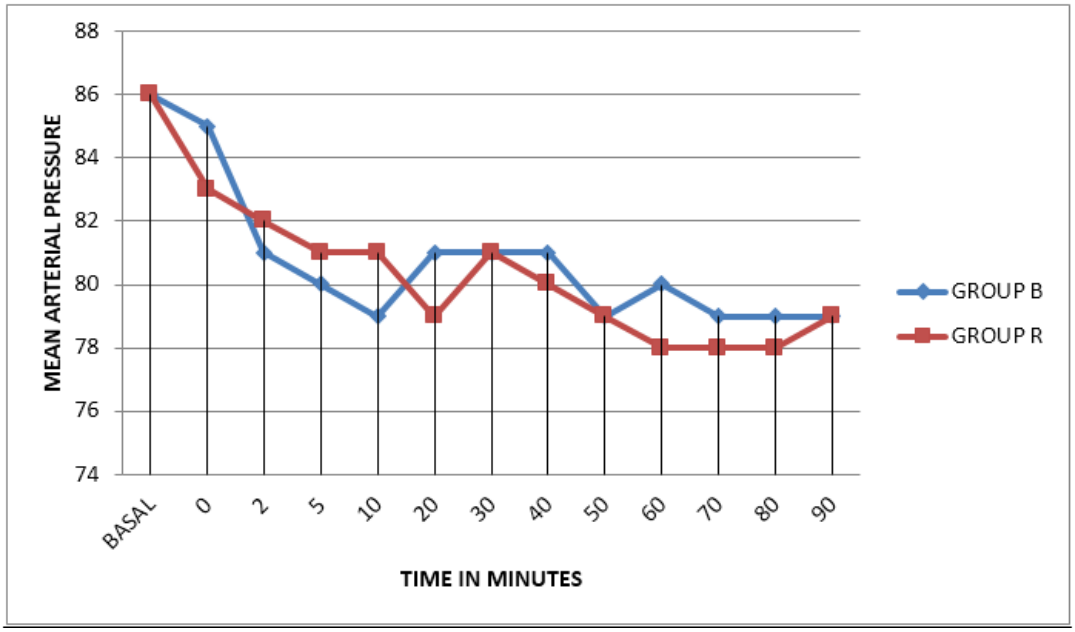

DISCUSSION: Epidural anaesthesia and analgesia is considered by many as the gold standard technique for major lower abdominal & extremity surgery. It has the potential to provide complete analgesia for as long as the epidural is continued. Epidural techniques are particularly effective at providing dynamic analgesia, allowing the patient to mobilize and resume normal activities unlimited by pain. It also improves the postoperative outcome and attenuates the physiologic response to surgery, in particular significant reduction in pulmonary infections, pulmonary embolism, ileus, acute renal failure and blood loss.

The sensory blockade onset was assessed after attaining at level L1. 23 patients in group B and 16 patients in group R had onset of sensory blockade in 1-2 minutes. 7 patients in B and 14 patients in group R had sensory blockade in 3-5 min. The mean time of onset of sensory blockade in group B was 1.72±1.09mins and group R was 2.32±1.05mins. Onset of sensory blockade was clinically faster in group B. The studies conducted by Brockway[5] et al and Brown et al comparing Bupivacaine and Ropivacaine for epidural anaesthesia did not find any statistically significant difference in the onset of sensory block which correlates with our study. The maximum level of sensory blockade in group B was T4 in group R was T5. The range of block in group was B T10-T4 in group R was T10-T5 and was clinically and statistically not significant. In the studies conducted by Katz[6] JA, Knarr D the maximum level of sensory block achieved was T4 with 0.5% Bupivacaine and T5 with 0.5% Ropivacaine which is comparable with our study.

The onset of motor blockade in group B was 5.12±2.35mins and in group R was 5.08±2.58mins. This was clinically and statistically not significant. In a study conducted by Brockway MS et al.10 the onset of motor block was 26±25mins with Ropivacaine 0.75% and 16±9mins with Bupivacaine 0.5% which is statistically not significant as our study. Whereas the time for maximum motor blockade in group B was 22.36±7.46mins and in group R was 28.77±8.69mins which was clinically and statistically significant with p value of 0.009. In the study conducted by Katz[6] JA, Knarr D et al the time for maximum motor block was with 0.75% Ropivacaine – 47±29mins and 0.5% Bupivacaine was 32±17mins which concurs with our study.

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The mean duration of analgesia in group B was 205.90±39.36mins and group R was 221.17±49.49mins. The duration of motor block in group B was 182.99±37.11mins and group R was 181.33±39.81mins. Our study correlates with study conducted by McGlade DP, Kalpokas MV,[7] where mean duration of analgesia at L1 was prolonged with Ropivacaine 0.75%–3.5hrs compared with bupivacaine 3.4hrs.There was no significant change in heart rates in both groups at various time intervals. The heart rates were comparable in both groups without any clinical or statistical significance. There was no statistically significant difference in SBP, DBP, MAP monitored at various intervals between the two groups as there was no statistically significant difference in the level of sensory block in both the groups. However 3 patients in group R and 3 patients in group B developed hypotension which was treated with intravenous fluids and inj mephentermine. In the studies conducted by Brockway et al, David L Brown et al, no statistical significant difference was found in SBP, DBP, MAP in both the groups which compares with our study.

CONCLUSION: This study which was conducted revealed that 15 ml of Ropivacaine (0.75%) when administered epidurally provides adequate anaesthesia for lower abdominal and extremity surgery. Onset of sensory blockade was slightly faster with Bupivacaine (0.5 %), with comparable level of sensory block, there is delayed onset of motor block and shorter duration of motor block and less intense motor block with Ropivacaine compared to Bupivacaine. Hence we conclude that Ropivacaine can be used successfully for epidural anaesthesia in lower abdominal and lower extremity surgerie

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