

Comparison of the effect of epidural levobupivacaine 0.5% 20 ml and ropivacaine 0.75%, 20 ml in lower limb surgeries

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Abstract

Introduction: Epidural blockade is becoming one of the most useful and versatile procedures in modern anesthesiology. It is unique in that it can be placed at virtually any level of the spine, allowing more flexibility in its application to clinical practice. It is more versatile than spinal anesthesia, giving the clinician the opportunity to provide anesthesia and analgesia, as well as enabling chronic pain management. It provides better postoperative pain control and more rapid recovery from surgery. **Materials and methods:** After obtaining informed written consent from patients, the study was conducted on 70 patients of either sex, between 18 and 65 years of age and belonging to the American Society of Anesthesiologists (ASA) Grade I and II physical status. Patients with the history of uncontrolled labile hypertension, heart block, dysrhythmia, on cardiac medication (adrenergic receptor antagonist, calcium channel blocker, or angiotensin converting enzyme inhibitor), addiction to narcotic, patient posted for lower segment cesarean section and with any contraindication to epidural anesthesia were not included in the study. **Results:** The objective of this study was to compare levobupivacaine 0.5% and ropivacaine 0.75% in epidural anesthesia in lower limb surgeries, with respect to onset and duration of motor blockade and sensory blockade, maximum dermatomal level of analgesia and time taken to achieve that. Group wise distribution of demographic data, like age, height, weight, body mass index (BMI), and sex were tabulated. On perusal of the same, we observe no significant deviation in any of these data among different groups of the cases. P value range was 0.067-0.982. **Conclusion:** It can be concluded that onset of sensory and motor block for levobupivacaine is delayed as compared with ropivacaine. Ropivacaine has shorter duration of motor block when compared with levobupivacaine. Thus, ropivacaine and levobupivacaine both can be used as an alternative to bupivacaine.

Key Words: Epidural blockade, hypertension, heart block, dysrhythmia.

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Introduction

Providing comfort to the patient by prevention and relief of pain and monitoring and maintenance of normal physiology during the perioperative period is the primary goal of an anesthesiologist[1].

Epidural blockade is becoming one of the most useful and versatile procedures in modern anesthesiology. It is unique in that it can be placed at virtually any level of the spine, allowing more flexibility in its application to clinical practice. It is more versatile than spinal anesthesia, giving the clinician the opportunity to provide anesthesia and analgesia, as well as enabling chronic pain management. It provides better postoperative pain control and more rapid recovery from surgery[2].

For orthopedic surgery, the provision of pain relief enables early post-operative mobilization, accelerates rehabilitation, and return to normal function[3].

Levobupivacaine and ropivacaine, the two new long-acting local anesthetics, have been developed as an alternative to bupivacaine, after the evidence of its severe toxicity[4]. Both of these agents are pure left-isomers and, due to their three-dimensional structure, seem to have less toxic effects on the central nervous system (CNS) and on the cardiovascular system[5,6].

Ropivacaine is developed as a pure S(-) enantiomer of ropivacaine. It is less lipophilic than bupivacaine and is less likely to penetrate large

myelinated motor fibers resulting in a relatively reduced motor blockade.

The reduced lipophilicity is also associated with decreased potential for CNS and cardiotoxicity. Thus, ropivacaine appears to be an important option for regional anesthesia and for the management of post-operative and labor pain[7,8].

Levobupivacaine, the isolated S(-) enantiomer of bupivacaine, has been shown to be less cardiotoxic than bupivacaine in preclinical studies. Owing to the lower affinity of the S(-) isomer to the cardiac sodium channels compared to the R(+) isomer, it is associated with less cardiac side effects[9,10].

Hence, in this study, we compared levobupivacaine 0.5% and ropivacaine 0.75% in epidural anesthesia in elective lower limb surgeries.

Aims and objectives

The main objective of this study is to compare levobupivacaine 0.5% and ropivacaine 0.75% in epidural anesthesia in elective lower limb surgeries

Materials and methods

Study Design

Cross-sectional.

Study Period

November 2020-April 2021.

Study Location

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Study Area

Patients posted for lower limb orthopedic surgeries.

Sample Size

70 patients, 35 in each group.

After obtaining informed written consent from patients, the study was conducted on 70 patients of either sex, between 18 and 65 years of age and belonging to the American Society of Anesthesiologists (ASA) Grade I and II physical status.

Patients with the history of uncontrolled labile hypertension, heart block, dysrhythmia, on cardiac medication (adrenergic receptor antagonist, calcium channel blocker, or angiotensin converting enzyme inhibitor), addiction to narcotic, patient posted for lower segment cesarean section and with any contraindication to epidural anesthesia were not included in the study.

1. Group R -20 ml of 0.75% ropivacaine

2. Group L - 20 ml of 0.5% levobupivacaine. In each group, equal volume was injected.

All patients were preloaded with 15 ml/kg of Ringer Lactate. In the operation theater pulse oximetry (Spo₂), noninvasive blood/pressure and electrocardiogram were monitored and in sitting posture epidural catheter was placed into L2-L3 or L3-L4 epidural space under strict aseptic conditions, using Tuohy’s needle with loss of resistance technique. Onset, duration and quality of anesthesia were assessed.

Sensory block was assessed bilaterally by short hypodermic needle in mid clavicular line motor block was assessed by modified bromage scale. The changes in above parameters were clinically and statistically compared.

Statistical Analysis

Results were expressed by standard methods, i.e., as mean ± standard deviation. Unpaired t-test was used for analysis in numerical data while for frequency Fisher exact test was applied. Statistical analysis was performed by SPSS (version 20.0). P-value was considered significant if <0.05 and highly significant if <0.001.

Results

The objective of this study was to compare levobupivacaine 0.5% and ropivacaine 0.75% in epidural anesthesia in lower limb surgeries, with respect to onset and duration of motor blockade and sensory blockade, maximum dermatomal level of analgesia and time taken to achieve that.

As shown in Table 1 and Figure 1 group wise distribution of demographic data, like age, height, weight, body mass index (BMI), and sex were tabulated. On perusal of the same, we observe no significant deviation in any of these data among different groups of the cases. P value range was 0.067-0.982.

Table 1: Demographic characteristics

Demographic parameter	Groups (Mean ±SD)		P value
	Group R	Group L	
Age in years	36.74±11.70	42.67±14.50	0.065
Height in cm	163.51±5.03	163.65±5.50	0.982
Weight in kg	64.31±6.23	64.46±5.36	0.918
BMI	23.82±1.49	24.04±1.27	0.505
Sex			
Male (%)	28 (78%)	25 (70%)	0.638
Female (%)	7 (22%)	10 (30%)	

Table 2: Onset of sensory block and motor block among the groups

Onset time of block	Group R Mean ±SD (min)	Group L Mean ±SD (min)	P value
Sensory Block	9.9±1.78	11.31±1.5	0.001
Motor Block	30.14±5.6	29.8±5.3	0.713

Table 3: Duration of motor block and duration of sensory block among the groups

Duration in minutes	Group R Mean ±SD (min)	Group R Mean ±SD (min)	P value
Duration of motor block	242±71.6	278±74	0.043
Duration of sensory block	388±70.2	385±72	0.853

The time required for regression of sensory block in patients of the groups R and L was 84.6 ± 4.47 and 192.2 ± 17.01 min, respectively, the corresponding regression time required for motor blocks was 81.37 ± 5.52 and 124.57 ± 11.88 min.

Table 4: The time regression of blocks among the groups

Time of regression of block (min)	Group R Mean ±SD (min)	Group R Mean ±SD (min)	P value
Sensory block	84.6±4.47	192.2±17.01	0.001
Motor block	81.37±5.52	124.57±11.88	0.001

Table 5: Duration of analgesia among the groups

Duration of analgesia	Group R Mean ±SD (min)	Group R Mean ±SD (min)	P value
Duration of analgesia (in min)	218±19.6	213±12	0.273

Duration of analgesia was respectively 218 ± 19.6 and 213 ± 12 min for members of group R and L. There was no marked difference in the duration of analgesia between the patients of group L and R.

Discussion

Levobupivacaine and ropivacaine, the two new long-acting local anesthetics, have been developed as an alternative to bupivacaine,

after the evidence of its severe toxicity. Both of these agents are pure left-isomers and, due to their three-dimensional structure, seem to have less toxic effects on the CNS and on the cardiovascular system.

Group R receiving 20 ml of 0.75% ropivacaine, group L receiving 20 ml of 0.5% levobupivacaine. Distribution of demographic data - such as age, height, weight, BMI, and sex - were observed, on perusal of the same we observe no significant deviation in any of these data

among different groups of the cases. An Indian study by Kameshwara Rao et al. reported that patients studied in the three groups did not vary much with respect to age, sex or weight[7].

The highest sensory level of T7-T8 segment was found to be 74.3% and 51.4%, respectively, among the members of each of the groups (as named R, L) respectively. The variation in the sensory level among the members of different groups, in respect of each of these segments was however not significant. Chandran et al. also reported that the mean maximum sensory level reached was T8 in ropivacaine and bupivacaine groups with the volume administered. An Indian study reported that there was no difference in highest level of sensory blockade in the three groups. Few studies reported, equal doses of levobupivacaine and bupivacaine (15 ml of 0.5%) provide maximum cephalic spread (T7-T8) and duration of analgesia (4-6 h)[8].

Conclusion

It can be concluded that onset of sensory and motor block for levobupivacaine is delayed as compared with ropivacaine. Ropivacaine has shorter duration of motor block when compared with levobupivacaine. Thus, ropivacaine and levobupivacaine both can be used as an alternative to bupivacaine.

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