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Original Research

To evaluate the efficacy of epidural levobupivacaine 0.75% against racemic bupivacaine in patients undergoing lower abdominal surgery

[1]Manish Kumar, [2]Himanshu Yadav

[1]Assistant Professor, Department of General Surgery, Major S D Singh Medical College & Hospital, Farukkhabad, Uttar Pradesh, India;
[2]Assistant Professor, Department of Anaesthesia, Major S D Singh Medical College & Hospital, Farukkhabad, Uttar Pradesh, India

ABSTRACT:
Aim: The purpose of this study is to evaluate the efficacy of epidural levobupivacaine 0.75% against racemic bupivacaine in patients undergoing lower abdominal surgery. **Materials and Methods:** Epidural Levobupivacaine 0.75% and Racemic Bupivacaine were compared in the current prospective trial for lower abdominal surgery. Before the research began, ethical permission was obtained from the institute's ethics committee, and the patient's signed agreement was obtained after being informed about the investigation. The research comprised 20–65-year-old patients with ASA physical status I–II who were scheduled to have elective lower abdomen surgery under epidural anaesthesia. **Results:** 100 patients in all were participated in the trial, and they were split into two groups before receiving double-blind anaesthesia. Levobupivacaine was in group A, while buprenorphine was in group B. The average time it took for levobupivacaine and bupivacaine groups to reach a level of sensory block sufficient for surgery (T10) was 14.01 minutes and 15.02 minutes, respectively. T 6.99 dermatone was the maximum spread for group A, while T 7.69 dermatone was the maximum spread for group B. For group A, it took 26.58 minutes, while for group B, it took 27.85 minutes to reach the maximum spread. Regression to T10 took 382.55 minutes in group A and 361.58 minutes in group B. In groups A and B, full regression took 549.89 and 506.96 minutes, respectively. Group A's anaesthesia lasted for 371.22 minutes, whereas group B did so for 333.25 minutes. **Conclusion:** According to the findings of this research, the sensory and motor block that is induced by 0.75% levobupivacaine is equal to that which is created by 0.75% racemic bupivacaine.
Keywords: Epidural levobupivacaine 0.75%, bupivacaine, lower abdominal surgery

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Corresponding Author: Himanshu Yadav, Assistant Professor, Department of Anesthesia, Major S D Singh Medical College & Hospital, Farukkhabad, Uttar Pradesh, India

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INTRODUCTION

Regional anaesthesia is the use of certain, reversible medicines (local anaesthetics) to stop nerve impulse conduction[1].Both general anaesthesia and central neuraxial block may be used during lower abdomen and lower extremities procedures. Depending on the dosage, concentration, or volume of local anaesthetic, an epidural block causes sympathetic blockade, sensory analgesia or anaesthesia, and motor blockade[2]. Drugs are injected via a catheter inserted into the epidural space to initiate epidural anaesthesia. The injection may prevent impulses from passing via nerve fibres in or close to the spinal cord. There are three different ways to provide local anaesthetics: 1) continuous infusion Patient-controlled extradural analgesia (PCEA) 3) sporadic bolus[3].A local anaesthetic, an opioid, or both may be administered to a patient getting an epidural. The most often used local anaesthetics include lidocaine, mepivacaine, bupivacaine, ropivacaine, and chloroprocaine[4]. Morphine, fentanyl, sufentanil, buprenorphine, tramadol, and pethidine are examples of common opioids. A commercial preparation of bupivacaine, a common local anaesthetic used in regional anaesthesia, is available as a racemic combination (50:50) of its two enantiomers, levobupivacaine, S (-)

isomer, and dextrobupivacaine, R (+). The R (+) isomer of bupivacaine has been associated with a number of severe cardiovascular and central nervous system responses that have been documented in the literature after accidental intravascular administration or intravenous regional anaesthesia. Due to their quicker protein binding rates, levorotatory isomers have been shown to have a safer pharmacological profile with less cardiotoxic and neurotoxic effects. Thus, ropivacaine and levobupivacaine, the pure S (-) enantiomers of bupivacaine, were brought into clinical anaesthetic practice[5]. Epidural Levobupivacaine 0.75% and Racemic Bupivacaine were compared in the current prospective trial for lower abdominal surgery.

MATERIALS AND METHODS

Epidural Levobupivacaine 0.75% and Racemic Bupivacaine were compared in the current prospective trial for lower abdominal surgery. Before the research began, ethical permission was obtained from the institute's ethics committee, and the patient's signed agreement was obtained after being informed about the investigation. The research comprised 20–65-year-old patients with ASA physical status I–II who were scheduled to have elective lower abdomen surgery under epidural anaesthesia. Patients having a history of severe renal, hepatic, pulmonary, or cardiac illness as well as neurological, neuromuscular, or mental disorders were also not allowed to participate in the trial. The research involved 100 patients who were randomly split into two groups. All patients received a midazolam (1–5 mg) premedication after receiving a 500 mL IV infusion of lactated Ringer's solution. At the L2-3 or L3-4 interspace, skin and subcutaneous tissues were infiltrated with 1% lidocaine (3 mL). Patients were placed in the lateral decubitus position, and the epidural space was located using an 18-gauge Tuohy needle and a loss of resistance to saline method. Following a negative aspiration, a "test dose" of 15 micrograms of epinephrine was newly mixed with 3 mL of a double-blinded research solution containing either 0.75% levobupivacaine or 0.75% racemic bupivacaine. When there was no sign of an intravascular or subarachnoid injection (sensory block, heart rate of 100 bpm, systolic blood pressure of 90 mm Hg, etc.) After two minutes, 17 mL of the double-blinded research solution (either 0.75% levobupivacaine or 0.75% racemic bupivacaine) were gradually injected over a five-minute period (6 mL, 1 minute wait, 6 mL, 1 minute wait, and the last 5 mL). A dosage of 150 mg was given in the first administration of 20 mL of the study medication. For the purposes of the following patient evaluation, "time 0" was defined as the moment the study medication injection ended. The needle was withdrawn after advancing a 20-gauge catheter 3–4 cm into the epidural space. The anesthesiologist decided when and how much extra midazolam, propofol (2 mg/kg to 2.5 mg/kg), and N2O were administered through a laryngeal mask for intraoperative sedation. In anticipation of the block from levobupivacaine or bupivacaine dissolving, all patients received 3 mg of epidural morphine two hours after the study medication was administered to give future analgesia. A sensory block bilaterally to dermatome T10 was considered sufficient to begin surgery. The major effectiveness metric was the amount of time needed to reach this degree of anaesthesia. Additional measurements were peak block height, peak block time, two-segment regression time, regression to T10 time, and overall sensory block duration. At 0, 2, 5, 10, 15, 20, 25, 30, and 60 minutes after injection, as well as every 30 minutes after that, sensory block was assessed using the blunt end of a 27-gauge dental needle. After the epidural injection was finished, the surgical operation was not begun for another 30 minutes. Using a modified Bromage scale, the onset, severity, and duration of motor block were assessed in both legs. Scores ranged from zero—no paralysis—to one—inability to raise an extended leg—the ability to move the knees—two—inability to move the ankles—and three—inability to move any part of the lower limb. Motor block was measured before surgery at 0, 10, 20, and 30 minutes, and then every 30 minutes after surgery until the patient's scores in both legs reverted to zero. All negative outcomes were noted throughout the investigation. The data was collected, and data analysis was performed. A P-value of 0.05 or less was regarded as statistically significant.

RESULTS

100 patients in all were participated in the trial, and they were split into two groups before receiving double-blind anaesthesia. Levobupivacaine was in group A, while buprenorphine was in group B. The average time it took for levobupivacaine and bupivacaine groups to reach a level of sensory block sufficient for surgery (T10) was 14.01 minutes and 15.02 minutes, respectively. T 6.99 dermatone was the maximum spread for group A, while T 7.69 dermatone was the maximum spread for group B. For group A, it took 26.58 minutes, while for group B, it took 27.85 minutes to reach the maximum spread. Regression to T10 took 382.55 minutes in group A and 361.58 minutes in group B. In groups A and B, full regression took 549.89 and 506.96 minutes, respectively. Group A's anaesthesia lasted for 371.22 minutes, whereas group B did so for 333.25 minutes. 30 mins time taken to reach bromage scale 0 in Group A (N=12) and Group B(N=7). For bromage scale 1 in group A; n=26 and in group B; n=11 whereas for bromage scale 2 in group A; n=8 and for group B; n=25. For bromage scale 3 in group A; n=4 and for group B; n=7. For max. gradebromage scale 0 in Group A; n=10 and Group B;n=15. For bromage scale 1 in group A;n=15 and in group B; n=7 whereas for bromage scale 2 in group A; n=12 and for group B; n=22. For bromage scale 3 in group A; n=13 and for group B; n=6. In group A, there were 4 patients with hypotension, 2

with bradycardia, and 3 with nausea and vomiting. In group B, there were 7 patients with hypotension, 3 with bradycardia, and 5 with nausea and vomiting.

Table 1: Effectiveness of sensory block

Variable	Group A	Group B	p-Value
Onset to T10 (min)	14.01±2.36	15.02±4.58	0.02
Maximum spread (dermatomes)	6.99±1.18	7.69±1.33	
Time to maximum spread (min)	26.58±2.88	27.85±3.66	
Regression to T10 (min)	382.55±12.85	361.58±15.85	
Time to complete regression (min)	549.89±17.96	506.96±16.66	
Duration (min)	371.22±12.36	333.25±11.98	

Table 2: Lower extremity motor block (Bromage score) after 30 min and max. grade

Bromage score	Group A		Group B	
	After 30 mins	Max. grade	After 30 mins	Max. grade
0	12	10	7	15
1	26	15	11	7
2	8	12	25	22
3	4	13	7	6

Table 3: Side effects between two groups

Side effects	Group A	Group B
Hypotension	4	7
Bradycardia	2	3
Nausea & Vomiting	3	5

DISCUSSION

For many lower abdomen and lower limb procedures, epidural anaesthesia is a commonly used regional anaesthetic method. Epidural anaesthesia has advantages over spinal anaesthesia, including less often occurring hypotension, longer operation times, and efficient postoperative analgesia.The effectiveness of the local anaesthetic medications now used for epidural anaesthesia varies, ranging from those with low strength like procaine to those eight to ten times more strong like etidocaine and buprenorphine. Unfortunately, local anaesthetics' toxicity rises along with their strength. Due to some patients' abrupt cardiovascular collapse, bupivacaine, one of the most often used local anaesthetics, has been the focus of extensive research[6–8]. Levobupivacaine is a brand-new local anaesthetic that has structural similarities with buprenorphine. Unlike bupivacaine, which is manufactured as a racemic mixture, levobupivacaine is synthesised as the s-isomer. The systemic toxicity of different substances' S-isomer may be lower than that of racemic preparations, according to earlier research on the isomers of local anaesthetics.Ekenstam et al. synthesised bupivacaine (1-butyl-2,6-pipecoloxylidide) in 1957, and it was first used in therapeutic settings in 1963[9]. The most used medication for the central neuraxial blockade is bupivacaine. Levobupivacaine and dextrobupivacaine, sometimes referred to as the S() and R(+) enantiomers of the ocular isomers, are combined in equal proportions to form buprenorphine[10].Levobupivacaine and bupivacaine were compared in a research by Cox CR et al, who observed no significant differences in the timing of sensory block[11].

Levobupivacaine 0.5% induces an epidural sensory block with a comparable start to that induced by the same amount of 0.5% Bupivacaine, according to CasatiA et al.[12]

In a research by Kopacz et al., it was shown that Levobupivacaine and Bupivacaine had comparable effectiveness for the amount of time needed to achieve a sufficient sensory block for surgery. After giving the epidural injection, sensory block at T10 was obtained after 15 minutes in both groups, and the maximal spread of sensory block was seen after 30 minutes.[13] Similar to our results, Bergamaschi et al.'s observations of a delayed start of the motor blockade with levobupivacaine compared to bupivacaine. Additionally, 66.7% of levobupivacaine patients and 43.5% of bupivacaine patients had hypotension, according to him. This could be the result of his research population, which included parturients scheduled for lower segment caesarean sections. Bupivacaine had a considerably greater level of motor block than the groups treated with levobupivacaine and ropivacaine, according to De Negri et al. research [15]. In contrast to our work, Locatelli et al.[16] likewise demonstrated more motor blockage in the bupivacaine group compared to the levobupivacaine group. In a double-blind investigation, Casati et al.[17] noted the two-segment regressions and the beginning time of sensory block. According to Kopacz et al., the most frequent adverse event was hypotension, which was noted by a comparable percentage of patients in both treatment groups before surgery (21%

levobupivacaine, 18% bupivacaine) and during surgery (32% in both treatment groups).[13]

CONCLUSION

According to the findings of this research, the sensory and motor block that is induced by 0.75% levobupivacaine is equal to that which is created by 0.75% racemic bupivacaine.

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