

## Original Research

### Efficacy of levobupivacaine and isobaric bupivacaine with buprenorphine for spinal anaesthesia

Dinesh Mohan Agarwal

Assistant professor, Department of Anaesthesiology, Mulayam Singh Yadav Medical College & Hospital, Meerut, Uttar Pradesh, India

#### ABSTRACT:

**Background:** Spinal anaesthesia with bupivacaine is the most common technique used in patients undergoing lower limb and lower abdominal surgeries. The present study compared the anaesthetic efficacy of levobupivacaine and isobaric bupivacaine with buprenorphine for spinal anaesthesia. **Materials & Methods:** 60 patients aged 18–65 years, American Society of Anesthesiologists grade I-II, scheduled for lower abdominal and lower limb surgery under spinal anaesthesia were divided into 2 groups of 30 each. Group I patients received 0.5% isobaric racemic bupivacaine 3 ml with 2 µg/kg of buprenorphine and group II patients received 0.5% isobaric levobupivacaine 3 ml with 2 µg/kg of buprenorphine. **Results:** Group I had 20 males and 10 females and group II had 16 males and 14 females. Time for sensory block to T10 dermatome was 4.6 minutes and 5.2 minutes in group I and group II, time for max sensory block was 8.6 minutes and 9.4 minutes, time taken to regress to T10 was 264.5 minutes and 266.7 minutes, maximum motor block (bromage score) was 3 each, time for maximum motor block was 9.4 minutes and 9.7 minutes, total duration of motor block was 221.5 minutes and 215.7 minutes and total duration of analgesia was 294.5 minutes and 297.4 minutes in group I and group II respectively. The difference was significant ( $P < 0.05$ ). **Conclusion:** Both bupivacaine and levobupivacaine were equally effective with buprenorphine for spinal anaesthesia.

**Key words:** Bupivacaine, Levobupivacaine, Spinal anaesthesia.

Received: 12 May, 2019

Accepted: 26 June 2019

**Corresponding author:** Dr. Dinesh Mohan Agarwal, Assistant professor, Department of Anaesthesiology, Mulayam Singh Yadav Medical College & Hospital, Meerut, Uttar Pradesh, India

**This article may be cited as:** Agarwal DM. Efficacy of levobupivacaine and isobaric bupivacaine with buprenorphine for spinal anaesthesia. *J Adv Med Dent Sci Res* 2019;7(7): 230-233.

#### INTRODUCTION

Spinal anaesthesia with bupivacaine is the most common technique used in patients undergoing lower limb and lower abdominal surgeries. However, bradycardia and systemic hypotension are the most common side-effects seen with this technique. Marked hypotension may be harmful, particularly in elderly patients with limited cardiac reserve. Levobupivacaine, an amide local anaesthetic agent, is the isolated S-enantiomer of racemic bupivacaine.<sup>1</sup> Bupivacaine contains an asymmetric carbon atom that gives it a chiral centre. It is a racemic mixture of two enantiomers: levo- or S (-) Bupivacaine and dextro- or R (+) bupivacaine.<sup>2</sup> These have identical physical and chemical properties, but there is evidence of stereo specificity of action, in particular with relation to cardiotoxicity, Bupivacaine induced cardiotoxicity has been mostly related to the effects of its R (+) enantiomer, which exhibits a higher potency for blocking cardiac Na<sup>+</sup> and K<sup>+</sup> channels.<sup>3</sup> Studies in

animal models with levo isomer, Levobupivacaine, showed that its lethal dose is 1.3 to 1.6 times greater than that of the racemic presentation. In human beings, Levobupivacaine has a less negative inotropic effect and would cause a smaller lengthening of the PR and QT intervals in the electrocardiogram, it characterizes the intoxication of the racemic formulation.<sup>4,5</sup>

The clinical studies available on intrathecal anaesthesia with levobupivacaine suggest that it achieves satisfactory surgical anaesthesia but with an unpredictable spread of sensory blockade.<sup>6</sup> The present study compared the anaesthetic efficacy of levobupivacaine and isobaric bupivacaine with buprenorphine for spinal anaesthesia.

#### MATERIALS & METHODS

The present study was conducted on 60 patients aged 18–65 years, American Society of Anesthesiologists grade I-II, scheduled for lower abdominal and lower

limb surgery under spinal anaesthesia. Written consent was obtained from all patients. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 30 each. Group I patients received 0.5% isobaric racemic bupivacaine 3 ml with 2 µg/kg of buprenorphine and group II patients received 0.5% isobaric levobupivacaine 3 ml with 2 µg/kg of buprenorphine. The time for onset of

sensory block between the two groups was the primary end-point. Other measurements included haemodynamic variables, sensory and motor blockade characteristics, postoperative analgesia, and complications in the first 24 hours. Results between both groups were analyzed statistically. P value less than 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Groups	Group I	Group II
Drug	0.5% bupivacaine + 2 µg/kg of buprenorphine	0.5% levobupivacaine + 2 µg/kg of buprenorphine
M:F	20:10	16:14

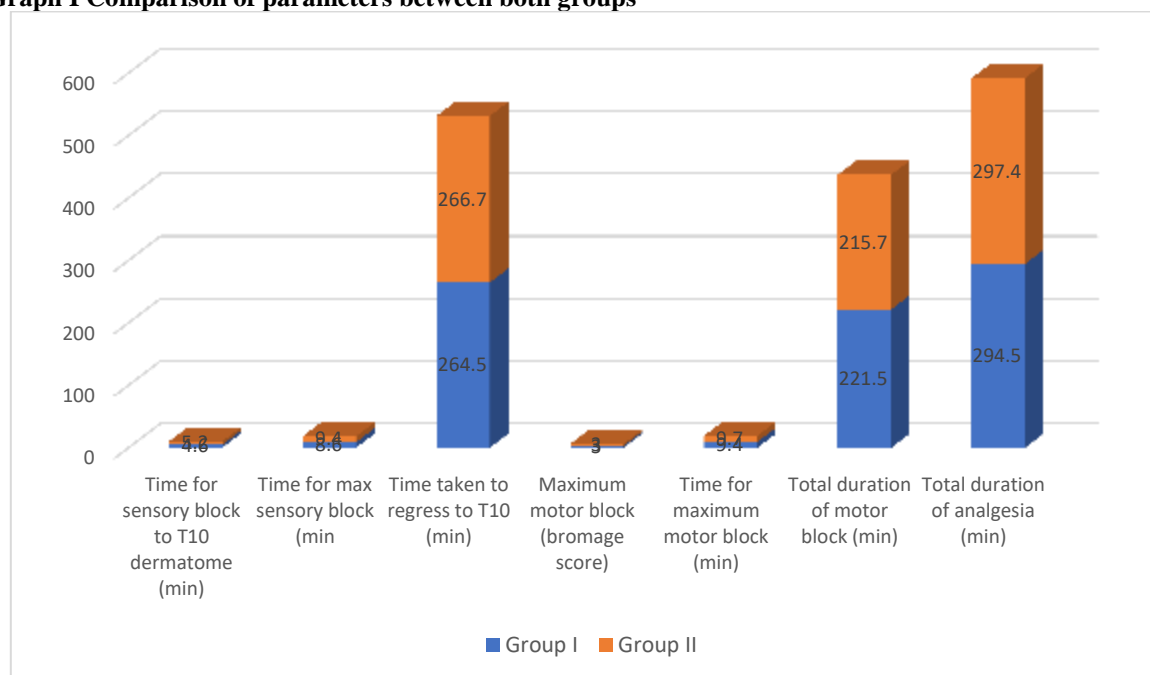
Table I shows that group I had 20 males and 10 females and group II had 16 males and 14 females.

**Table II Comparison of parameters between both groups**

Parameters	Group I	Group II	P value
Time for sensory block to T10 dermatome (min)	4.6	5.2	0.12
Time for max sensory block (min)	8.6	9.4	0.15
Time taken to regress to T10 (min)	264.5	266.7	0.21
Maximum motor block (bromage score)	3	3	0.51
Time for maximum motor block (min)	9.4	9.7	0.17
Total duration of motor block (min)	221.5	215.7	0.82
Total duration of analgesia (min)	294.5	297.4	0.48

Table II, graph I shows that time for sensory block to T10 dermatome was 4.6 minutes and 5.2 minutes in group I and group II, time for max sensory block was 8.6 minutes and 9.4 minutes, time taken to regress to T10 was 264.5 minutes and 266.7 minutes, maximum motor block (bromage score) was 3 each, time for maximum motor block was 9.4 minutes and 9.7 minutes, total duration of motor block was 221.5 minutes and 215.7 minutes and total duration of analgesia was 294.5 minutes and 297.4 minutes in group I and group II respectively. The difference was significant (P < 0.05).

**Graph I Comparison of parameters between both groups**



## DISCUSSION

Levobupivacaine, an amide local anaesthetic agent, is the isolated S-enantiomer of racemic bupivacaine. It is the most recent long-acting local anaesthetic agent to have been introduced for clinical use.<sup>7</sup> Studies of toxicity with levobupivacaine are rare, and occasional toxic symptoms are usually reversible with minimal treatment without any fatal outcome. However, levobupivacaine has not entirely replaced bupivacaine in clinical practice. In other researches, although its clinical effects were not significantly different from those of bupivacaine, there was some variability in efficacy findings in different clinical populations.<sup>8</sup> The present study compared the anaesthetic efficacy of levobupivacaine and isobaric bupivacaine with buprenorphine for spinal anaesthesia.

In present study, group I had 20 males and 10 females and group II had 16 males and 14 females. Ture et al<sup>9</sup> compared the anaesthetic potency and haemodynamic effects of intrathecal bupivacaine with buprenorphine versus levobupivacaine with buprenorphine in infraumbilical surgeries. The patients either received 0.5% isobaric racemic bupivacaine 3 ml with 2 µg/kg of buprenorphine (Group B) or 0.5% isobaric levobupivacaine 3 ml with 2 µg/kg of buprenorphine (Group L). There was no significant difference in the onset of sensory block between the two groups. Sensory and motor blockade characteristics were similar between the two groups. However, there was significant fall in the heart rate at 5 min in Group B compared to Group L. There was statistically significant fall in systolic blood pressure in group B compared to Group L from 5 min up to 60 min and fall in diastolic blood pressure from 10 minutes to 45 minutes.

We observed that time for sensory block to T10 dermatome was 4.6 minutes and 5.2 minutes in group I and group II, time for max sensory block was 8.6 minutes and 9.4 minutes, time taken to regress to T10 was 264.5 minutes and 266.7 minutes, maximum motor block (bromage score) was 3 each, time for maximum motor block was 9.4 minutes and 9.7 minutes, total duration of motor block was 221.5 minutes and 215.7 minutes and total duration of analgesia was 294.5 minutes and 297.4 minutes in group I and group II respectively. Behr et al<sup>10</sup> added buprenorphine (0.15 mg) to levobupivacaine for brachial plexus block. There were significant differences in the onset and the duration of the sensory block and in the duration of postoperative analgesia. Epineural buprenorphine prolonged postoperative analgesia more effectively than intramuscular buprenorphine, which suggests that buprenorphine acts at a peripheral nervous system site of action.

Singh et al<sup>11</sup> compared buprenorphine and fentanyl when added as an adjuvant to intrathecal ropivacaine in an attempt to prolong the duration of spinal anaesthesia. Group I ( $n = 30$ ) patients were administered 3 ml of intrathecal solution (2.8 ml of

0.75% ropivacaine + 0.2 ml of isotonic sodium chloride), while Groups II and III patients ( $n = 30$  each) received 2.8 ml 0.75% ropivacaine + 0.2 ml buprenorphine (60 µg) and 2.8 ml 0.75% ropivacaine + 0.2 ml fentanyl (10 µg), respectively. Time to onset of sensory and motor block in all the three groups was comparable. However, duration of sensory block was significantly prolonged in Groups II and III in comparison to Group I ( $P < 0.05$ ) and it was the longest in Group II ( $P < 0.05$ ). The duration of motor blockade was similar in all the three groups. The time to first analgesic dose was also significantly prolonged in Groups II and III as compared to Group I ( $P < 0.05$ ) but was comparable between Groups II and III. Intra- and post-operative hemodynamic parameters, as well as side effects, were comparable. Fattorini et al<sup>12</sup> assessed clinical and anaesthetic features of intrathecal levobupivacaine and racemic bupivacaine in patients undergoing major orthopedic surgical procedures. They concluded that notwithstanding the complete absence of any significant haemodynamic complications in the patients of levobupivacaine group, further and larger studies are needed to assess if levobupivacaine is preferable to bupivacaine for minimizing the possible cardiovascular impact of spinal anaesthesia.

## CONCLUSION

Author found that both bupivacaine and levobupivacaine were equally effective with buprenorphine for spinal anaesthesia.

## REFERENCES

1. Bidikar M, Mudakanagoudar MS, Santhosh MC. Comparison of intrathecal bupivacaine and levobupivacaine plus fentanyl for cesarean section. *Anesth Essays Res* 2017;11:495-8.
2. Erdil F, Bulut S, Demirbilek S, Gedik E, Gulhas N, Ersoy MO, et al. The effects of intrathecal levobupivacaine and bupivacaine in the elderly. *Anaesthesia* 2009;64:942-6.
3. del-Rio-Vellosillo M, Garcia-Medina JJ, Abengochea-Cotaina A, Pinazo-Duran MD, Barbera-Alacreu M. Spinal anaesthesia for knee arthroscopy using isobaric bupivacaine and levobupivacaine: Anesthetic and neuroophthalmological assessment. *Bio Med ResInt* 2014;2014:349034.
4. Burlacu CL, Buggy DJ. Update on local anesthetics: Focus on levobupivacaine. *Ther Clin Risk Manag* 2008;4:381-92. doi: 10.1155/2014/349034.
5. Sahin AS, Turker G, Bekar A, Bilgin H, Korfali G. A comparison of spinal anaesthesia characteristics following intrathecal bupivacaine or levobupivacaine in lumbar disc surgery. *Eur Spine J* 2014;23:695-700.
6. Attri JP, Kaur G, Kaur S, Kaur R, Mohan B, Kashyap K, et al. Comparison of levobupivacaine and levobupivacaine with fentanyl in infraumbilical surgeries under spinal anaesthesia. *Anesth Essays Res* 2015;9:178-84.
7. Ipe S, Korula S, Varma S, George GM, Abraham SP, Koshy LR, et al. A comparative study of intrathecal and epidural buprenorphine using combined spinal-

- epidural technique for caesarean section. *Indian J Anaesth* 2010;54:205-9.
8. Glaser C, Marhofer P, Zimpfer G, Heinz MT, Sitzwohl C, Kapral S, et al. Levobupivacaine versus racemic bupivacaine for spinal anesthesia. *Anesth Analg* 2002;94:194-8.
  9. Ture P, Ramaswamy AH, Shaikh SI, Alur JB, Ture AV. Comparative evaluation of anaesthetic efficacy and haemodynamic effects of a combination of isobaric bupivacaine with buprenorphine vs. isobaric levobupivacaine with buprenorphine for spinal anaesthesia – A double blinded randomised clinical trial. *Indian J Anaesth* 2019;63:49-54.
  10. Behr A, Freo U, Ori C, Westermann B, Alemanno F. Buprenorphine added to levobupivacaine enhances postoperative analgesia of middle interscalene brachial plexus block. *J Anesth* 2012;26:746-51.
  11. Singh AP, Kaur R, Gupta R, Kumari A. Intrathecal buprenorphine versus fentanyl as adjuvant to 0.75% ropivacaine in lower limb surgeries. *J Anaesthesiol Clin Pharmacol* 2016;32:229-33.
  12. Fattorini F, Ricci Z, Rocco A, Romano R, Pascarella MA, Pinto G, et al. Levobupivacaine versus racemic bupivacaine for spinal anaesthesia in orthopaedic major surgery. *Minerva Anesthesiol* 2006;72:637-44.