



## A comparative study between bupivacaine and levobupivacaine in Supraclavicular brachial plexus block

### KEYWORDS

Levobupivacaine, bupivacaine, supraclavicular brachial plexus block, sensory and motor block

**Dr. Mahesh Kumar**

Assistant professor, Department of Anaesthesia, Jawaharlal Nehru Medical College, Bhagalpur, Bihar

### ABSTRACT

**Background:** Bupivacaine in supraclavicular brachial plexus block is well known & very potent local anaesthetic but it is highly cardiotoxic and neurotoxic. It's recently introduced isomer levobupivacaine is proved to be less cardiotoxic and neurotoxic. Peripheral nerve blocks have assumed a prominent role in modern anaesthesia practice as they provide ideal operative conditions without any general anaesthesia or adverse haemodynamic effects. When compared with ropivacaine, levobupivacaine is a newer, safer, longer acting local anaesthetic with rapid onset and prolonged duration of analgesia and similar or more pronounced nerve blocking effects, depending on the concentration. Hence the present study is aimed to compare the effectiveness of 0.5% levobupivacaine and 0.5% ropivacaine in supraclavicular brachial plexus block. **Materials and Methods:** In this study, 60 cases were taken posted for elective upper limb orthopaedic surgeries. Patients were randomized using sealed envelopes technique in 2 groups. (group B-30 ml 0.5% bupivacaine/ group L-30 ml 0.5% levobupivacaine). Study was done in Anaesthesia department of JLNMC, Bhagalpur, Bihar from October 2015 to September 2016. The group included both males and females. **Results:** Statistical differences in latency, failure rate, and degree of the motor blockade, and failure of the sensorial blockade between both groups were not observed, but the latency of the sensorial blockade in all metameres analyzed showed statistically significant difference.

### Introduction-

Recently peripheral nerve block anaesthesia has become popular against general anaesthesia as it is devoid of side effects of intubation and muscle relaxants and systemic haemodynamic changes. This type of anaesthesia is particularly advantageous in case of prolonged orthopedic, plastic reconstructive surgeries and in emergency surgeries. Scientific confirmation of the cardiac toxicity of bupivacaine in the 1980s stimulated experimental studies with its enantiomers, which indicated lower cardiodepressor activity of S(-) bupivacaine (levobupivacaine). Several clinical studies on neuroaxis block have shown that the efficacy and the duration of the motor blockade of levobupivacaine are similar to that of racemic bupivacaine, while others observed that the duration of its motor blockade is shorter than that of racemic bupivacaine. Peripheral nerve block anaesthesia had many advantages over general anaesthesia such as cost effective, favourable postoperative recovery profile, preserves CNS functions and prevents complications of intubation, laryngoscopy and muscle relaxants. Local anaesthetic drugs are used to provide analgesia in regional block technique. Bupivacaine and lignocaine are most commonly used drugs for brachial plexus block. The cardiotoxicity shows enantioselectivity, it is more pronounced with R (+) racemic bupivacaine. The S (-) enantiomers- levobupivacaine and ropivacaine are less cardiotoxic. Several studies comparing ropivacaine with levobupivacaine and racemic bupivacaine for different nerve blocks showed that nerve blocks produced by ropivacaine have a clinical profile similar to that obtained with bupivacaine and levobupivacaine when used at similar concentrations and doses. Other studies, however, found prolongation of sensory analgesia with levobupivacaine compared to ropivacaine.

### Materials and methods

In this study, 60 cases were taken posted for elective upper limb orthopaedic surgeries. Patients were randomized using sealed envelopes technique in 2 groups. (group B-30 ml 0.5% bupivacaine/ group L-30 ml 0.5% levobupivacaine). Study was done in Anaesthesia department of JLNMC, Bhagalpur, Bihar from October 2015 to September 2016. The group included both males and females.

### INCLUSION CRITERIA

1) Age: 18 to 50 years. 2) Gender: Either gender. 3) Patients scheduled for elective upper limb orthopaedic surgery 4) ASA physical status I and II.

### EXCLUSION CRITERIA

1. Patients refusing consent. 2. Contraindications to regional anaesthesia. 3. Previous nerve injury. 4. Any major systemic illness like diabetes mellitus, hypertension, IHD etc.

Patients were randomly allocated to one of the two groups of 60 patients each by distributing sealed envelopes. Group B (n = 60) – Patients received 30 ml of 0.5% bupivacaine Group L (n = 60) – Patient received 30 ml of 0.5% levobupivacaine

### Results

Patient characteristics in terms of age, sex, weight, height and ASA physical status were comparable among the two groups of patients. Duration of surgery was also comparable in the two groups. (P>0.05). On comparison of group B with group L, the difference in mean time for onset, peak and duration of sensory blockade and motor blockade were not significant. (P>0.05). The duration of effective analgesia was comparable in both the groups (P>0.05). There were no significant difference in the time of first rescue analgesic requirement after 12th, 16th and 20th hour in group B and group L. The analgesic requirements of both the groups were similar. There was no significant difference in total dose of rescue analgesics required in group L as compared to group B.

### Discussion-

Peripheral nerve blocks are cost effective anaesthetic techniques used to provide anaesthesia and analgesia by avoiding airway instrumentation and haemodynamic changes of general anaesthesia. Patients satisfaction, safety, growing demand for cost effective anaesthesia and a favourable postoperative recovery profile have resulted in increased demand for regional techniques. Among various types of brachial plexus block the supraclavicular approach has been considered the most efficacious. It is often described as "spinal anaesthesia for upper extremity" because of its ubiquitous application for upper extremity surgery characteristically associated with a rapid onset of anaesthesia, high success rate, complete and predictable anaesthesia for upper extremity. Bupivacaine is commonly used local anaesthetic drug for brachial plexus block because of its long duration of action and a favourable ratio of sensory to motor neural block. However, its toxicity is a concerning issue especially when larger doses are used in peripheral nerve blocks or prolonged infusions for postoperative analgesia.

In one of the study, reverse trend, viz. the duration of motor block and

sensory block, was prolonged for ropivacaine when compared with levobupivacaine with statistical significance. In this study, levobupivacaine showed significantly longer duration of analgesia ( $12.56 \pm 1.30$  h) when compared with ropivacaine ( $9.93 \pm 1.7$  h;  $P < 0.05$ ). Mageswaran and Choy, observed no significant difference in VAS score and, hence, the time for rescue analgesia in both the groups when compared with our study. Cline et al. observed that the ropivacaine group showed slightly higher verbal numerical rating scale scores at 8th and 10th hour postoperatively. No such difference was found in our study. No significant intraoperative and postoperative complications such as pneumothorax, intra-arterial or intravascular placement of drug, nausea, vomiting, neurotoxicity, or cardiotoxicity were found in either group.

#### Conclusion-

To conclude, both levobupivacaine and bupivacaine are equally efficacious with regards of sensory and motor blockade without potential harm. Our study showed that peripheral nerve blocks with levobupivacaine 0.5% and ropivacaine 0.5% provide comparable postoperative analgesia for patients undergoing upper limb surgeries.

#### References-

1. Clarkson CW, Hondeghem LM - Mechanism for bupivacaine depression of cardiac conduction: fast block of sodium channels during the action potential with slow recovery from block during diastole. *Anesthesiology*, (1985;62:396-405)
2. Bernards CM, Carpenter RL, Kenter ME et al. - Effect of epinephrine on central nervous system and cardiovascular system toxicity of bupivacaine in pigs. *Anesthesiology*, (1989;71:711-717)
3. Feldman HS, Arthur GR, Covino BG - Comparative systemic toxicity of convulsant and supraconvulsant doses of intravenous ropivacaine, bupivacaine and lidocaine in the conscious dog. *Anesth Analg*, (1989;69:794-801)
4. Ohmura S, Kawada M, Ohta T et al. - Systemic toxicity and resuscitation in bupivacaine-, levobupivacaine-, or ropivacaine-infused rats. *Anesth Analg*, (2001; 93: 743-748)
5. Liisanantti O, Luukkonen J, Rosenberg PH (2004) High-dose bupivacaine, levobupivacaine and ropivacaine in axillary brachial plexus block. *Acta Anaesthesiol Scand* (48:601-606)
6. Cline E, Franz D, Polley RD, Maye J, Burkard J, et al. (2004) Analgesia and effectiveness of levobupivacaine compared with ropivacaine in patients undergoing an axillary brachial plexus block. *AANA J* (72: 339-345)
7. Sessler DI, Rubinstein EH, Moayeri A. Physiological responses to mild perianesthetic hypothermia in humans. *Anesthesiology*, (1991;75:594-610)
8. Sessler DI. Perioperative hypothermia. *New England Journal of Medicine*, (1997;336:1730-77)
9. De Jong R. Regional anaesthesia and analgesia. In Brown DL, ed *Local anesthetic pharmacology*. Philadelphia, Saunders; (1996: 124-42)
10. Liisanantti O, Luukkonen J, Rosenberg PH. High-dose bupivacaine, levobupivacaine and ropivacaine in axillary brachial plexus block. *Acta Anaesthesiol Scand* (2004; 48(5):601-6)