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Original Research Article

Comparative study of (0.5%) levobupivacaine and (0.75%) ropivacaine in supraclavicular brachial plexus block by lateral approach

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ABSTRACT

Background: As compared to general anaesthesia, brachial plexus block for upper limb surgery gives fewer side effects and better postoperative analgesia. The objective of this study was to evaluate the effects of 0.5% levobupivacaine and compare it with 0.75% ropivacaine.
Methods: For this prospective randomized, controlled study, 60 patients of both sexes of ASA grade 1 and 2 were enrolled and divided into two groups and supraclavicular brachial plexus block was performed by lateral approach using 30 ml of 0.5% levobupivacaine and 0.75% ropivacaine. The onset of sensory and motor block, duration of sensory and motor block and analgesia and possible adverse events were recorded.
Results: No statistically significant difference was observed in the onset of sensory block in both groups. Onset of motor block was significantly faster in levobupivacaine group ($P<0.05$). Duration of sensory block, motor block and analgesia was significantly longer in levobupivacaine group ($P<0.05$).
Conclusions: 0.5% levobupivacaine is better alternative to 0.75% ropivacaine in brachial plexus block in term of early onset of sensory block and long duration of analgesia.

Keywords: Brachial plexus, Levobupivacaine, Ropivacaine

INTRODUCTION

As compared to general anaesthesia, brachial plexus block for upper limb surgery gives fewer side effects and better postoperative analgesia. Supraclavicular brachial plexus block gives complete anaesthesia below midarm as nerves are tightly packed in this area.[1] It is often called "spinal of the upper limbs " because of rapid onset of anaesthesia, high success rate, complete and predictable anaesthesia.[2] Kulenkamff described the classical approach of supraclavicular brachial plexus block.[3] Volker Hempel has described that supraclavicular brachial plexus block can be done by inserting needle longitudinal to brachial plexus from lateral to medial.[4]

Ropivaciane is pure S-enantiomer amino amide local anaesthetic. It is chemically similar to bupivacaine; the butyl group being replaced by a propyl group. It produces similar sensory block and less motor blockade, with less cardiac and CNS toxicity compared to bupivacaine.[5,6]

Levobupivacaine, the S-enantiomer of bupivacaine is the latest local anaesthic agent introduced into clinical practice. It has lesser cardiac and CNS toxicity than bupivacaine.[5,6]

The objective of this study was to compare the -

- Onset of sensory and motor block

- Duration of sensory and motor block
- Duration of analgesia
- Hemodynamic parameters
- Complications.

METHODS

This study was approved by the institutional ethical committee.

Inclusion criteria

Patients of ASA grade 1 and 2 of both sex, between age 20 to 50 years, undergoing elective below mid arm surgery.

Exclusion criteria

Patients with any comorbidity, patients with history of psychiatric illness, patients allergic to local anesthetic and those patients who refused the procedure.

After fulfilling inclusion and exclusion criteria 60 patients were selected for the study. Randomization was done by closed envelop method and allocated into two groups.

Group L (n=30): Brachial plexus block done by 30 ml of (0.5%) levobupivacaine.

Group R (n=30): Brachial plexus block done by 30 ml of (0.75%) ropivacaine.

Written informed consent was taken from each patient. One observer performed the brachial plexus block in each patients and assessment of parameters of study was done by another observer who was blinded to the study drug. The study was prospective, randomized, double blinded and controlled.

All patients are kept nil per orally for at least 6 hours before the procedure and pre-medicated with injection glycopyrrolate 5 mcg/kg and midazolam 0.05 mg/kg. After shifting on operation table a multipara monitor was attached and base line parameters pulse rate, noninvasive blood pressure, respiratory rate and oxygen saturation were recorded. The patients were laid down supine with head turned to opposite side and arm by the side of the chest. A folded sheet was placed below the shoulder to make the field more prominent. After all aseptic precaution, an intradermal wheal was raised with 1% lignocine at needle entry point. With standing at the head end and slightly towards the side, a 5 cm 22 G needle was inserted at angle of 20 degree centigrade to the skin 1 cm above the clavicle, at the junction of inner two third and outer one third of the clavicle which is approximately 1 cm medial to trapezius muscle. The needle was then directed from lateral to medial side behind the omohyoid muscle and parallel to the clavicle till paranesthesia in hand was elicited. The study drug was injected slowly with constant negative aspiration according to the allocation of group.

Sensory block was graded as

- Grade 0 (No block) - Normal sensitivity
- Grade 1 (Onset) - Reduced sensitivity compared to same territory in opposite side.
- Grade 2 (Partial) - Analgesia or loss of sharp sensation of pinprick.
- Grade 3 (Complete) - Anaesthesia or loss of sensation to touch.

Onset time of sensory block was from the time of injection of drug to time of first detection of diminished sensation. Completion time of sensory block was from the time of injection of drug to time of loss of pain on pinprick. Duration of sensory block was the time from the onset of analgesia to the recurrence of pain to pinprick.

Motor blockade was graded as

- Grade 0 - No block
- Grade 1 (onset) - Decreased movement with loss of strength
- Grade 2 (Partial) - Decreased movement with inability to move limb against resistance
- Grade 3 (complete) - Paralysis.

Onset time of motor block was from the time of injection to time of first detection of diminished power. Completion time of motor block was from the time of injection of drug to complete loss of movement. Duration of motor block was the time from onset of paresis to the recurrence of motor movement. Duration of effective analgesia was from the time between the end of local anaesthesia administration to the time when visual analogue score (VAS) was less than 4.

Grade 2 and 3 sensory and motor block was considered as successful block. Hemodynamic parameters were recorded at regular interval and any adverse effect like hypotension, bradycardia was recorded. Data were analyzed by student t- test and chi- square test. Data was expressed as mean and standard deviation. P- value <0.05 was considered significant.

RESULTS

A total of 60 patients were enrolled in the study but final analysis was done in 56 patients as there was 2 failed block in each group. Demographic variables, site and duration of surgery were comparable between the both group ($P>0.05$) (Table 1).

As shown in Table 2, there is no any significant difference between Group L and Group R in sensory block onset time but motor block onset time was significantly more in Group R. Duration of sensory block,

motor block and analgesia was significantly more in Group L. Hemodynamic parameters (heart rate, systotic blood pressure, diastolic blood pressure) were comparable between two groups. Except vessel puncture, no other complications such as pheumothorax, phrenic nerve palsy, neurotoxicity and cardiotoxicity were found in either groups.

Table 1: Demographic data, site and duration of surgery.

	Group L	Group R
Age (Years) (Mean±SD)	35.15±11.29	34.67±12.08
Weight (kg) (Mean±SD)	54.57±6.44	55.92±5.23
Sex ratio (M:F)	20:8	18:10
ASA grade		
1	21	22
2	7	6
Site of surgery		
Elbow	3	4
Forearm	20	18
Hand	5	6
Duration of Surgery (Min.) (Mean±SD)	95.00±21.46	98.20±23.77

Table 2: Onset of sensory and motor block, duration of sensory block, motor block and analgesia.

	Group L	Group R	P Value
Onset time of sensory block (Min) (Mean±SD)	11.82±1.36	12.84±2.69	>0.05
Onset time of motor block (min) (Mean±SD)	12.87±2.44	16.05±3.05	<0.001
Duration of sensory block (hrs) (Mean±SD)	12.53±1.41	9.17±2.03	<0.001
Duration of motor block (hrs) (Mean±SD)	11.67±1.73	8.04±1.85	<0.001
Duration of analgesia (Hrs) (Mean±SD)	13.47±1.18	10.26±1.32	<0.001

DISCUSSION

In this study, no statistically significant difference was found in the onset of sensory block in both the groups but onset of motor block was significantly faster in levobupivacaine group. Duration of sensory and motor block was significantly shorter in ropivacaine group. Duration of analgesia was significantly longer in levobupivacaine group. Piangatelli C et al compared 0.5% levobupivacaine with 0.75% ropivacaine in the infra-clavicular brachial plexus block and showed that onset time for motor block was greater in ropivacaine group however sensory onset time was same in both group. The sensory block and motor block was longer in levobupivacaine group.[7]

Cacciapuoti A et al reported that both sensory and motor onset times were faster with 0.75% ropivacaine (7.5±1.2 min and 14.0±2.3 min respectively) when compared with 0.5% levobupivacaine (10±2.4 and 17±5 min respectively) in axillary block.[8] Liisanantti et al concluded that axillary brachial plexus block with 45 ml of 0.5% racemic bupivacaine, levobupivacaine and ropivacaine produced adequate aneathesia without any clinically significant differences.[9] Diodonato A et al compared 0.5% levobupivacaine with 0.75% ropivacaine for peribulbar anaethesia in cataract surgery and found that levobupivacaine showed significant reduction in average sensory and motor onset time and mean duration of sensory and motor block was also higher in levobupivaciane group.[10]

Despite the high dose of levobupivacaine and ropivacaine used in peripheral blocks, serious cardiovascular, pulmonary or neurological complications are rare. This study results are also similar.[9,11-13]

CONCLUSION

Present study can conclude that 0.5% levobupivacaine is better alternative to 0.75% ropivacaine in supraclavicular brachial plexus block in terms of early onset of sensory block and long duration of analgesia but when early return of motor activity is required ropivacaine should be considered. Both the drugs are devoid of any side effects and maintain perioperative hemodynamic profile stable.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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