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ORIGINAL RESEARCH

Bupivacaine versus levobupivacaine in supraclavicular brachial plexus block

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ABSTRACT

Background: Upper limb surgeries can be performed under various regional blocks such as supraclavicular, infraclavicular, interscalene, axillary etc. The present study was conducted to assess effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block.

Materials & Methods: 80 patients were given brachial plexus block by supraclavicular approach for various upper limb surgeries of both genders were divided into 2 groups of 40 each. Group I patients received bupivacaine and group B received levobupivacaine. Onset and duration of sensory and motor block was recorded.

Results: Group I had 23 males and 17 females and group II had 22 males and 18 females. The mean onset of sensory block was 11.8 minutes in group I and 9.1 minutes in group II, onset of motor block was 13.9 minutes in group I and 10.3 minutes in group II, duration of sensory block was 810.8 minutes in group I and 1020.6 minutes in group II, duration of motor block was 924.2 minutes in group I and 1154.4 minutes in group II and duration of analgesia was 908.2 minutes in group I and 1050.0 minutes in group II. The difference was significant ($P< 0.05$).

Conclusion: It was found that levobupivacaine has a faster onset of both sensory and motor blockade as compared to bupivacaine.

Key words: bupivacaine, motor blockade, Upper limb surgeries

Introduction

Upper limb surgeries can be performed under various regional blocks such as supraclavicular, infraclavicular, interscalene, axillary etc. The various techniques for nerve location include ultrasound, peripheral nerve stimulator and elicitation of paresthesia. The local anesthetics traditionally used have been lignocaine and bupivacaine with or without adjuvants. The adjuvants used to enhance the onset time, prolong blockade5 and reduce the dosage of local anesthetic include adrenaline, sodium bicarbonate, opioids, alpha 2 adrenergic agonists etc.[1]

Brachial plexus block is a regional technique commonly employed for upper limb surgeries.[2] The advantages offered by regional blocks for upper limb surgeries over general anesthesia include pre-emptive analgesia, stable intra-operative hemodynamics, lesser incidence of postoperative nausea and vomiting, superior post-operative analgesia, less time in post anesthesia care unit (PACU) and shorter hospital stay. The associated sympathetic blockade decreases vasospasm and edema.[3]

There are various approaches to perform BPB, depending on the patient's condition and the medical team's expertise.[4] The supraclavicular approach is an efficient and acceptable method for BPB Given the

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ease of procedure, high success rates, fast blockade onset time, and high single-shot efficient blockade rates, the supraclavicular approach under ultrasound guidance is a suitable choice for BPB. Levobupivacaine which is the levo-enantiomer of bupivacaine, is gaining popularity since it is known to cause lesser cardiac toxicity than racemic bupivacaine.[5]The present study was conducted to assess effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block.

Materials & Methods

The present study consisted of 80 patients of ASA I & II status planned for brachial plexus block by supraclavicular approach for upper limb surgeries of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 40 patients each. Group I patients received bupivacaine and group B received levobupivacaine. Duration of analgesia was considered as the time taken to reach an NRS score of 3. Onset and duration of sensory and motor block was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I: Distribution of patients

Groups	Group I (40)	Group II (40)
Male	23	22
Female	17	18

Table I shows that group I had 23 males and 17 females and group II had 22 males and 18 females.

Table II: Comparison of parameters

Parameters (minutes)	Group I	Group II	P value
Onset of sensory block	11.8	9.1	0.05
Onset of motor block	13.9	10.3	0.04
Duration of sensory block	810.8	1020.6	0.03
Duration of motor block	924.2	1154.4	0.05
Duration of analgesia	908.2	1050.0	0.02

Graph I: Comparison of parameters

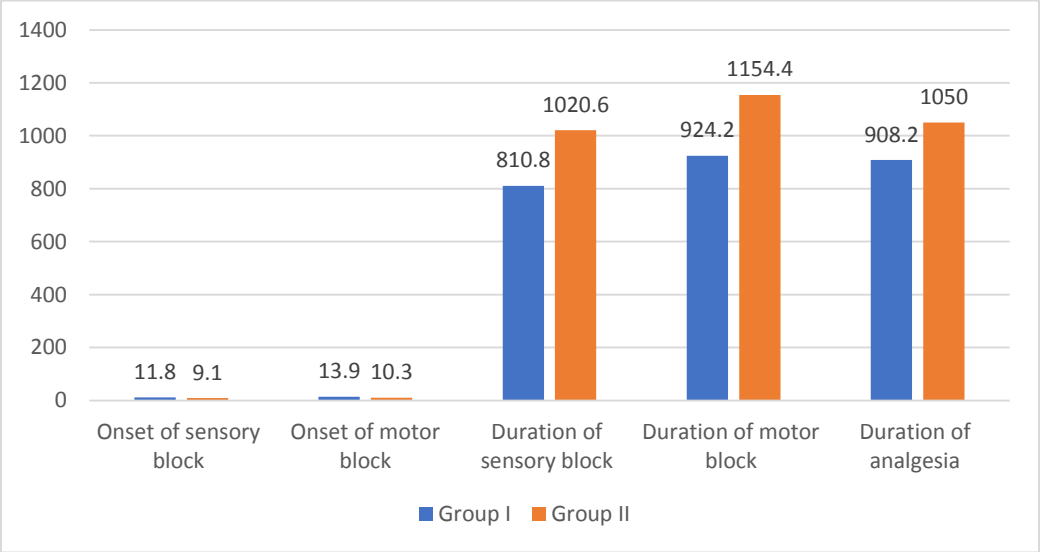

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Table II, graph I shows that mean onset of sensory block was 11.8 minutes in group I and 9.1 minutes in group II, onset of motor block was 13.9 minutes in group I and 10.3 minutes in group II, duration of sensory block was 810.8 minutes in group I and 1020.6 minutes in group II, duration of motor block was 924.2 minutes in group I and 1154.4 minutes in group II and duration of analgesia was 908.2 minutes in group I and 1050.0 minutes in group II. The difference was significant ($P< 0.05$).

Discussion

Bupivacaine has been shown to cause indirect depression of cardiac conduction (AV conduction, QRS complex) & contractility by blocking mainly inactivated state of sodium channels.[6] Studies demonstrate dextro (R+) enantiomer has 2.4 times higher affinity for cardiac sodium channels & dissociates from it slowly as compared to levo (S+) enantiomer. This explains the higher cardiac toxicity of racemic bupivacaine as compared to its levo isomer.[7] Also, levobupivacaine causes less rapid blockade of the cell firing in nucleus tractus solitaries (NTS) which explains its lower CNS toxicity compared to racemic bupivacaine. One more factor for difference in toxicity between the two enantiomers can be explained on the basis of their pharmacokinetics. The protein binding of levobupivaine is >97% as against 95% in case of bupivacaine.[8] This means <3% of levo is free in plasma to have action on other tissues causing undesired toxic effect. The addition of various drugs as adjuvants to the local anesthetic has been shown to have clinical and pharmacologic merits. Prolonged duration of analgesia, faster blockade onset, and decreased total anesthetic usage, thus an extended safety margin of the block, are among the advantages.[9] The present study was conducted to assess effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block.

We found that group I had 23 males and 17 females and group II had 22 males and 18 females. Ghasemi et al[10] 40 patients ranged from 20 to 65 years old were scheduled for elective upper limb surgeries were assigned to 2 equal study groups (n = 20), receiving 1 mL of 5 μg.mL-1 sufentanil (group S) or 1 mL of 100 μg.mL-1 dexmedetomidine (group D) in adjunction to 30 mL of 0.5% bupivacaine for supraclavicular BPB under the guidance of ultrasonography. Characteristics of local anesthesia and postoperative analgesia were evaluated. Group S also had significantly longer postoperative analgesia and lower opioid consumption within 24 hours after the surgery. None of the patients showed adverse effects concerning vital signs, nausea, or vomiting.

We observed that mean onset of sensory block was 11.8 minutes in group I and 9.1 minutes in group II, onset of motor block was 13.9 minutes in group I and 10.3 minutes in group II, duration of sensory block was 810.8 minutes in group I and 1020.6 minutes in group II, duration of motor block was 924.2 minutes in group I and 1154.4 minutes in group II and duration of analgesia was 908.2 minutes in group I and 1050.0 minutes in group II. FüsunEroğlu et al[11] in their study found that the onset of sensory block was faster with levobupivacaine than bupivacaine and the difference was statistically significant.

Kothari et al[12] in their study 60 patients of ASA I-II status in the age group of 18-60years given supraclavicular brachial plexus block for upper limb surgery. Levobupivacaine had a faster onset & longer duration of both sensory and motor blockade as compared to racemic bupivacaine. The hemodynamic profile of both drugs was similar and no adverse effect was found with either drug.

The shortcoming of the study is small sample size.

Conclusion

It was found that levobupivacaine has a faster onset of both sensory and motor blockade as compared to bupivacaine.

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