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ORIGINAL RESEARCH

Assessment of effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block

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ABSTRACT

Background:Brachial plexus block is a regional technique commonly employed for upper limb surgeries. The present study was conducted to assess effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block.

Materials & Methods:70 patients of ASA I & II status were given brachial plexus block by supraclavicular approach for various upper limb surgeries of both genders. Group I patients received bupivacaine and group B received levobupivacaine. Onset and duration of sensory and motor block was recorded. Duration of analgesia was considered as the time taken to reach an NRS score of 3.

Results: ASA grade I was seen in 25 in group I and 18 in group II and II in 10 in group I and 17 in group II. The mean age was 35.4 years in group I and 35.1 years in group II and weight was 61.2 Kgs in group I and 62.7 Kgs in group II. The mean onset of sensory block was 12.8 minutes in group I and 10.1 minutes in group II, onset of motor block was 14.9 minutes in group I and 11.3 minutes in group II, duration of sensory block (minutes) was 812.8 minutes in group I and 1024.6 minutes in group II, duration of motor block (minutes) was 926.2 minutes in group I and 1156.4 minutes in group II and duration of analgesia (minutes) was 910.2 minutes in group I and 1058.0 minutes in group II. The difference was significant (P< 0.05).

Conclusion: Levobupivacaine has a faster onset of both sensory and motor blockade as compared to bupivacaine.

Key words: bupivacaine, sensory blockade, motor blockade

Introduction

Brachial plexus block is a regional technique commonly employed for upper limb surgeries.[1] 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.[2]

There are various approaches to perform BPB, depending on the patient's condition and the medical team's expertise The supraclavicular approach is an efficient and acceptable method for BPB Given the 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.[3] 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.[4]

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 comprised of 70 patients of ASA I & II status given brachial plexus blockby supraclavicular approach for various 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. The classical approach to supraclavicular block was used. Group I patients received bupivacaine and group B received levobupivacaine. Onset and duration of sensory and motor block was recorded. Duration of analgesia was considered as the time taken to reach an NRS score of 3. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I Demographic profile

Groups	Group I	Group II	P value
ASA I/II	25:10	18:17	0.91
Age (years)	35.4	35.1	0.95
Weight (Kgs)	61.2	62.7	0.81

Table I shows that ASA grade I was seen in 25 in group I and 18 in group II and II in 10 in group I and 17 in group II. The mean age was 35.4 years in group I and 35.1 years in group II and weight was 61.2 Kgs in group I and 62.7 Kgs in group II. The difference was significant (P< 0.05).

Table II Comparison of parameters

Parameters	Group I	Group II	P value
Onset of sensory block	12.8	10.1	0.05
Onset of motor block	14.9	11.3	0.03
Duration of sensory block (minutes)	812.8	1024.6	0.02
Duration of motor block (minutes)	926.2	1156.4	0.04
Duration of analgesia (minutes)	910.2	1058.0	0.01

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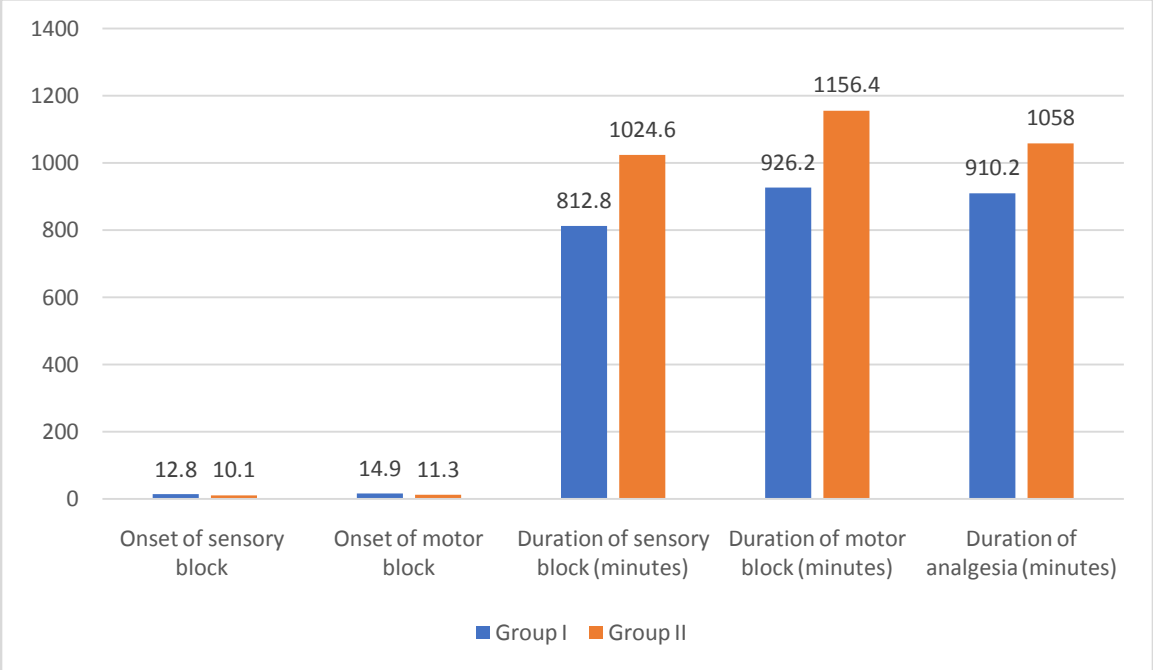
Table II, graph I shows that mean onset of sensory block was 12.8 minutes in group I and 10.1 minutes in group II, onset of motor block was 14.9 minutes in group I and 11.3 minutes in group II, duration of sensory block (minutes) was 812.8 minutes in group I and 1024.6 minutes in group II, duration of motor block (minutes) was 926.2 minutes in group I and 1156.4 minutes in group II and duration of analgesia (minutes) was 910.2 minutes in group I and 1058.0 minutes in group II. The difference was significant (P< 0.05).

Graph IComparison of parameters



Discussion

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.[6,7] 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.[8]The present study was conducted to assess effectiveness of bupivacaine versus levobupivacaine in supraclavicular brachial plexus block.

In present study, ASA grade I was seen in 25 in group I and 18 in group II and II in 10 in group I and 17 in group II. The mean age was 35.4 years in group I and 35.1 years in group II and weight was 61.2 Kgs in group I and 62.7 Kgs in group II. Kothari et al[9] 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.

We observed that mean onset of sensory block was 12.8 minutes in group I and 10.1 minutes in group II, onset of motor block was 14.9 minutes in group I and 11.3 minutes in group II, duration of sensory block (minutes) was 812.8 minutes in group I and 1024.6 minutes in group II,

duration of motor block (minutes) was 926.2 minutes in group I and 1156.4 minutes in group II and duration of analgesia (minutes) was 910.2 minutes in group I and 1058.0 minutes in group II.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.

Bupivacaine has been shown to cause indirect depression of cardiac conduction (AV conduction, QRS complex) & contractility by blocking mainly inactivated state of sodium channels. 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.[11] 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. This means <3% of levo is free in plasma to have action on other tissues causing undesired toxic effect.

FüsunEroğluet al[12], carried out a study to investigate whether there is significant difference between the block of morphine adjuncted bupivacaine and levobupivacaine in axillary perivascular brachial plexus block. They found that the onset of sensory block was faster with levobupivacaine than bupivacaine and the difference was statistically significant.

Conclusion

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

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