ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 68 . 16
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 4, Issue – 5, October - 2019, Page No. : 135 - 138

A randomized controlled double-blinded prospective study of the efficacy of clonidine added to bupivacaine as compared with bupivacaine alone used in supraclavicular brachial plexus block for upper limb surgeries

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: We compared the effects of clonidine added to bupivacaine with bupivacaine alone on supraclavicular brachial plexus block.

Methods: In this prospective, randomized,double-blinded, controlled trial, two groups of 50 patients each were investigated using (i) 40 ml of bupivacaine 0.25% plus 0.150 mg of clonidine and (ii) 40 ml of bupivacaine 0.25% plus1 ml of NaCl 0.9, respectively.

Results: It was observed that addition of clonidine to bupivacaine resulted in faster onset of sensory block, , prolongation of the motor block (as assessed by modified Lovett Rating Scale), prolongation of the duration of recovery of sensation and no association with any haemodynamic changes (heart rate and blood pressure), sedation or any other adverse effects. These findings suggest that clonidine added to bupivacaine is an attractive option for improving the quality and duration of supraclavicular brachial plexus block in upper limb surgeries.

Conclusion: In conclusion, clonidine added to bupivacaine is an attractive option for improving the quality and duration of supraclavicular brachial plexus block in upper limb surgeries

Keywords: Clonidine, Supraclavicular brachial plexus block, Sensory and motor block

Introduction

Peripheral neural blockade is a well-accepted component of comprehensive anesthetic care. Its role has extended not only intraoperative but also into postoperative period for analgesia and chronic pain management.

Brachial plexus block is one of the most widely used blocks for upper limb surgeries. Local anesthetic drugs have been traditionally used to provide anesthesia and analgesia with any regional block technique. Attempts have been made to prolong intraoperative anesthesia and postoperative analgesia, using various adjuvants.

Since the ‘80s, clonidine has been used as an adjunct to local anaesthetic agents in various regional techniques to extend the duration of block. The results of previous studies on the usefulness of clonidine on brachial plexus block have been mixed. Some studies have shown that clonidine prolongs the effects of local anaesthetics, but other studies have failed to show any effect of clonidine, independently from the type of local anaesthetic used (ropivacaine, bupivacaine and mepivacaine). Moreover, others have indicated an

increased incidence of adverse effects like sedation, hypotension and bradycardia. Clonidine has been shown to be of benefit for use in central neuraxial blocks and other regional blocks by increasing the duration and intensity of pain relief as also by decreasing the systemic and local inflammatory stress response. Also, there is no reason for it to be ineffective, specifically in brachial plexus blocks. This randomized, double-blind and placebo-controlled study tested the hypothesis that inclusion of clonidine with the local anaesthetic prolongs the duration of analgesia in supraclavicular brachial plexus block.[1-3]

Material and Methods

After thorough preoperative evaluation and written informed consent, 100 patients aged 18-60 years of ASA physical status I& II, scheduled for upper limb surgeries were included in study. Excluded from the study were patients who were ASA class III and above, patients for whom supraclavicular brachial plexus block or the study medications were contraindicated or those who had a history of significant neurological, psychiatric, neuromuscular, cardiovascular, pulmonary, renal or hepatic disease or alcohol or drug abuse, as well as pregnant or lactating women. Also barred from the study were patients taking medications with psychotropic or adrenergic activities and patients receiving chronic analgesic therapy.

In our study, two groups were investigated: Group I (bupivacaine–clonidine) received 40 ml of bupivacaine 0.25% plus 0.150 mg of clonidine and

Group II (bupivacaine) received 40 ml of bupivacaine 0.25% plus 1 ml of NaCl 0.9%. The anaesthetic solution was prepared according to a random-number table by means of a computer-generated randomization list by an anaesthetist not otherwise involved in the study. The anaesthetist performing the block was blinded to the treatment group. All observations were carried out by a single investigator who was also blinded to the treatment group.

Statistical Analysis

Statistical analysis was carried out using SSPS version 20. An unpaired‘t’ test was used to compare the demographic variables, onset and duration of sensory and motor blocks, sedation scores and pain scores by VAS Intraoperative haemodynamic variables between the 2 groups was compared using unpaired ‘t’ test. Intraoperative haemodynamic variables within group compared using paired ‘t’ test. A ‘p’ value <0.05 consider significant.

Results

Table 1: Demographic variable

Variable	Group-I	Group-II	p-value
Age	33.15±5.12	34.10±5.26	>0.05
Sex (M:F)	36:14	35:15	>0.05
ASA(I:II)	48:2	48:2	>0.05

Demographic variables age, gender, ASA grading and weight were comparable in both the groups. Also there was no statistical difference in the duration of surgery between the two groups.

Table 2: Comparison of sensory and motor block

Variable	Group-I	Group-II	p-value
Onset of sensory block (min)	7.21±1.15	6.8±1.35	>0.05
Onset of motor block (min)	13.21±2.15	13.35±2.30	>0.05
Duration of sensory block (hr)	6.64±0.81	4.24±0.42	<0.05
Duration of motor block (hr)	5.80±0.52	4.62±0.31	<0.05

The duration of sensory block was significantly higher in the group receiving clonidine (6.64±0.81) than those receiving placebo (4.424±0.42). Similar was the observation for duration of motor block, which was significantly higher in clonidine group (5.80±0.52) as compared to the placebo group (4.62±0.32).

Table 3: VAS score

VAS Score	Group-I	Group-II	p-value
10 mint.	6.68±1.18	7.18±1.24	>0.05
30 mint.	1.83±1.7	2.7±1.52	>0.05
4 hours	0.8±1.23	2.3±1.29	<0.05
6 hours	1.67±1.10	3.65±0.98	<0.05

The VAS of the two groups was consistently lower at all times in the clonidine group during onset till 30 min. Again, after4 hours, the VAS was significantly lower and thus we concluded that the action was prolonged.

Discussion

Supraclavicular blocks are performed at the level of the brachial plexus trunks. Here, almost the entire sensory, motor and sympathetic innervations of the upper extremity are carried in just three nerve structures (trunks), confined to a very small surface area. Consequently, typical features of this block include rapid onset, predictable and dense anaesthesia along with its high success rate.

Clonidine and local anaesthetic agents have a synergistic action. Clonidine enhances both sensory and motor blockade of neuraxial and peripheral nerves after injection of local anaesthetic solution, without affecting the onset.[4-6] This is thought to be due to blockage of conduction of A delta and C fibres, increase in the potassium conductance in isolated neurons *in vitro* and intensification of conduction block achieved by local anaesthetics.

Among the studies showing no positive effect of clonidine as an additive to brachial plexus blocks, various discrepancies have been discussed. In one, patients were not followed long enough (12 h) before any effect of clonidine could be detected. [7]

In another study, the authors found (surprisingly) that the time to first administration of opioids after the nerve block was shorter in patients who received local anaesthetic and clonidine compared with those who received local anaesthetic only. [8]

Conclusion

In conclusion, clonidine added to bupivacaine is an attractive option for improving the quality and duration of supraclavicular brachial plexus block in upper limb surgeries.

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