

Assessment of supraclavicular brachial plexus block with clonidine as adjuvant in upper limb surgery

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Abstract:

Background: Acute postoperative pain is the result of a complex physiological reaction to tissue injury. Clonidine is a selective alpha adrenergic receptor agonist and it has been used as an adjunct to LA in various doses. The present study was conducted to compare supraclavicular brachial plexus block with clonidine as adjuvant in upper limb surgery. **Materials & Methods:** 45 ASA I and II patients posted for unilateral upper limb surgery of both genders were randomly divided into 3 groups of 15 each. Group I received 15 mL of 2% lignocaine with adrenaline and 15 mL of 0.5% bupivacaine with 0.6 mL of normal, group II received 45 µg of clonidine and group III received 90 µg of clonidine along with the local anaesthetics. The time taken for onset and the duration of sensory and motor blocks, the time required for rescue analgesia was noted. **Results:** The mean age (years) was 32.1, 31.8 and 32.0, weight (Kgs) was 62.8, 64.5 and 65 and height (cm) was 157.2, 155.9 and 154.8 in group I, II and III respectively. In group I, group II and group III, mean sensory onset (minutes) was 13.4, 6.8 and 5.9, sensory duration (minutes) was 5.2, 6.0 and 8.3, motor onset (minutes) was 14.2, 7.2 and 6.5, motor duration (minutes) was 3.7, 5.2 and 8.1 and rescue analgesia (hours) was 4.7, 7.1 and 11.2 respectively. The difference was significant ($P < 0.05$). **Conclusion:** Clonidine is an attractive alternative as an adjuvant with bupivacaine and lignocaine in the ultrasound guided supraclavicular block for upper limb surgical procedures.

Key words: Clonidine, supraclavicular block, lignocaine

Introduction

Acute postoperative pain is the result of a complex physiological reaction to tissue injury. The dorsal horn of the spinal cord is the site of termination of primary afferents and there is complex interaction between such afferent fibers, intrinsic spinal neurons, descending pain modulating fibers, and various associated neurotransmitters such as serotonin, norepinephrine, acetylcholine, adenosine, and glutamate in the dorsal horn.¹ Local anesthetics administered as regional nerve blocks are utilized in providing postoperative pain relief in many surgical procedures by blocking signal traffic to the dorsal horn. Certain drugs may be used as adjuvant to local anesthetics to lower doses of each agent and enhance analgesic efficacy while reducing the incidence of adverse reactions.²

Clonidine is a selective alpha adrenergic receptor agonist and it has been used as an adjunct to LA in various doses.³ It definitely reduces the onset time and prolongs duration of anaesthesia. However, higher doses have demonstrated various side effects like hypotension, bradycardia, sedation, etc. Clonidine opens up potassium channels leading to membrane hyperpolarisation; this amplifies the sodium channel blockade of local anaesthetic agents. In this state the cell is not responsive to excitatory inputs.⁴

Clonidine has been shown to enhance the effectiveness of local anesthetics when administered via various routes (such as oral, intravenous, or epidural). When used as an adjuvant, clonidine can prolong the duration of regional anesthesia and provide additional pain relief.⁵ For upper limb surgeries, clonidine may be added to the local anesthetic solution used for

regional anesthesia techniques like brachial plexus blocks. It helps to reduce intraoperative and postoperative pain, potentially allowing for lower doses of local anesthetics and minimizing the need for additional analgesics.⁶ The present study was conducted to compare supraclavicular brachial plexus block with clonidine as adjuvant in upper limb surgery.

Materials & Methods

The present study consisted of 45 ASA I and II patients, who were posted for unilateral upper limb surgery of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Supraclavicular brachial plexus block

was performed using an ultrasound guided technique with a total volume of 30.6 mL of drugs. Patients were randomly divided into 3 groups of 15 each. Group I received 15 mL of 2% lignocaine with adrenaline (1 in 200000) and 15 mL of 0.5% bupivacaine with 0.6 mL of normal, group II received 45 µg of clonidine and group III received 90 µg of clonidine along with the local anaesthetics. The time taken for onset and the duration of sensory and motor blocks were noted until 24 hours postoperatively. Vitals were noted before, during and after anaesthesia. The time required for rescue analgesia was noted along with VAS scores and sedation scores. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Baseline characteristics

Characteristics	Group I	Group II	Group III
Age (years)	32.1	31.8	32.0
Weight (Kgs)	62.8	64.5	65
Height (cm)	157.2	155.9	154.8

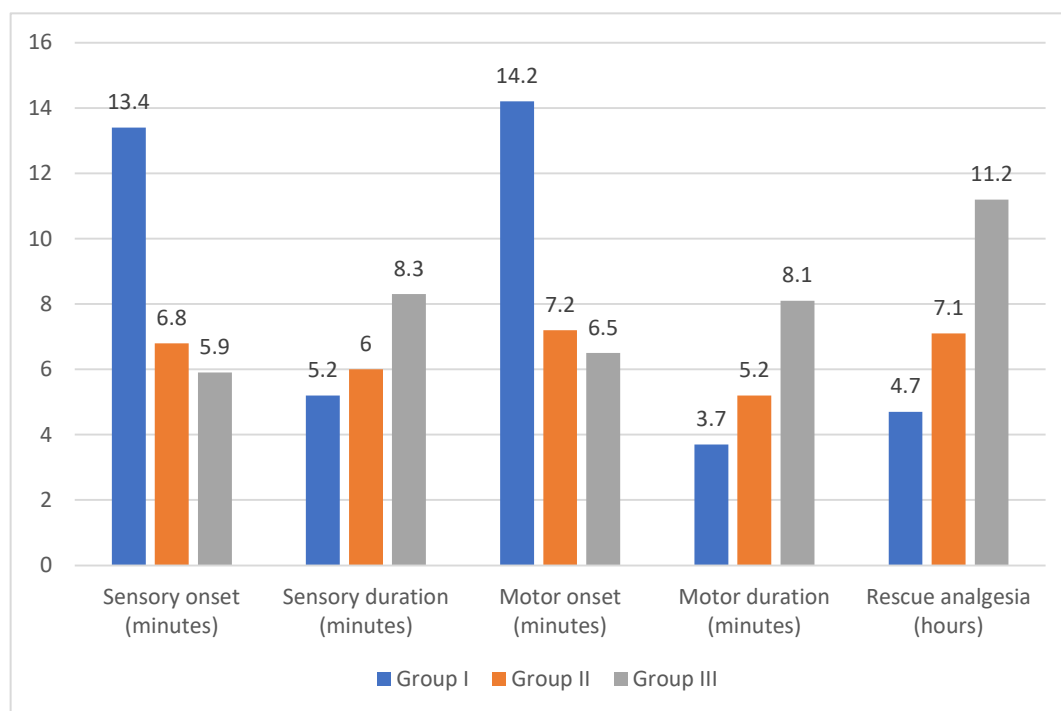
Table I shows that mean age (years) was 32.1, 31.8 and 32.0, weight (Kgs) was 62.8, 64.5 and 65 and height (cm) was 157.2, 155.9 and 154.8 in group I, II and III respectively.

Table II Comparison of parameters

Parameters	Group I	Group II	Group III	P value
Sensory onset (minutes)	13.4	6.8	5.9	0.01
Sensory duration (minutes)	5.2	6.0	8.3	0.02
Motor onset (minutes)	14.2	7.2	6.5	0.04
Motor duration (minutes)	3.7	5.2	8.1	0.05
Rescue analgesia (hours)	4.7	7.1	11.2	0.03

Table II, graph I shows that in group I, group II and group III, mean sensory onset (minutes) was 13.4, 6.8 and 5.9, sensory duration (minutes) was 5.2, 6.0 and 8.3, motor onset (minutes) was 14.2, 7.2 and 6.5, motor duration (minutes) was 3.7, 5.2 and 8.1 and rescue analgesia (hours) was 4.7, 7.1 and 11.2 respectively. The difference was significant (P<0.05).

Graph I Comparison of parameters



Discussion

Clonidine possesses sedative properties, which can be beneficial during upper limb surgeries performed under local anesthesia or regional blocks.⁷ By promoting sedation, clonidine can help patients remain calm and relaxed throughout the procedure, potentially reducing anxiety and improving patient comfort.⁸ The sedative effects of clonidine can be particularly useful when patients prefer to stay awake during the surgery or when general anesthesia is not indicated.⁹ It's worth noting that the use of clonidine in upper limb surgeries, as with any medication, should be determined by the healthcare provider based on individual patient factors, medical history, and the specific surgical procedure being performed.¹⁰ The dosage, timing, and route of administration of clonidine will depend on the patient's requirements and the anesthesiologist's judgment. It's essential to consult with your healthcare provider, such as an anesthesiologist or surgeon, who can evaluate your specific situation and determine the appropriate use of clonidine or any other medications during upper limb surgeries.¹¹

We found that mean age (years) was 32.1, 31.8 and 32.0, weight (Kgs) was 62.8, 64.5 and 65 and

height (cm) was 157.2, 155.9 and 154.8 in group I, II and III respectively. Adhikari et al¹² compared the efficacy of two moderate doses of clonidine as an adjuvant to lignocaine and bupivacaine in combination in supraclavicular brachial plexus block by using USG guided method. The mean duration (in minutes) of onset of motor block was 14.6 ± 3.024 in Group N, 7.567 ± 1.0726 in Group C1, 6.033 ± 1.756 in Group C2. The mean duration (in hours) of motor block was 3.8 ± 0.6967 in Group N, 5.65 ± 1.1533 in Group C1, 8.05 ± 0.9035 in Group C2. The mean onset of time (in minutes) of sensory block is 14.9 ± 3.1442 in Group N, 6.8 ± 1.0635 in Group C1 and 5.4 ± 2.4403 in Group C2. The mean duration (in hours) of sensory block was 4.233 ± 0.6915 in Group N, 5.833 ± 1.0367 in Group C1 and 8.417 ± 0.8914 in Group C2.

We observed that in group I, group II and group III, mean sensory onset (minutes) was 13.4, 6.8 and 5.9, sensory duration (minutes) was 5.2, 6.0 and 8.3, motor onset (minutes) was 14.2, 7.2 and 6.5, motor duration (minutes) was 3.7, 5.2 and 8.1 and rescue analgesia (hours) was 4.7, 7.1 and 11.2 respectively. Chakroborty et al¹³ evaluated the effect of this combination in supraclavicular brachial plexus block for upper limb orthopedic procedures. Group A (n = 35) patients received

25 ml of 0.5% bupivacaine and 0.2 ml (30 mcg) clonidine, whereas group B (n = 35) received 25 ml of 0.5% bupivacaine and 0.2 ml normal saline through a supraclavicular approach for brachial plexus block. Vital parameters were recorded 10 min prior to block placement and every 3 min thereafter till the end of the procedure. Onset and duration of both sensory and motor blocks and sedation score were recorded. All patients were observed in post anesthesia care unit and received tramadol injection as soon as they complained of pain as rescue analgesic. Duration of analgesia was taken as the time from placement of block till injection of rescue analgesic. Analgesia duration was 415.4 ± 38.18 min (mean \pm standard deviation) in Group A (clonidine) compared to 194.2 ± 28.74 min in Group B (control). No clinically significant difference was observed in heart rate, blood pressure, and oxygen saturation. Sedation score was higher in the clonidine group. Routray SS et al¹⁴ concluded in their study that adding clonidine to brachial plexus prolongs duration of anaesthesia and analgesia in brachial plexus block.

The limitation the study is small sample size.

Conclusion

Authors found that clonidine is an attractive alternative as an adjuvant with bupivacaine and lignocaine in the ultrasound guided supraclavicular block for upper limb surgical procedures.

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