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**Original Research Article**

# Comparison of Clonidine and Butorphanol as an Adjuvant to Levobupivacaine in Supraclavicular Brachial Plexus Block

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**Conflict of interest: Nil**

**Abstract:**

**Background:** Supraclavicular brachial plexus block provides safe, effective and low-cost anesthesia. There are always efforts to find better and safer local anesthesia along with adjuvant for supraclavicular brachial plexus block. Levobupivacaine has strongly emerged as a safer alternative for regional anesthesia than its racemic sibling bupivacaine. We conducted the study to compare levobupivacaine with clonidine or butorphanol for sensory block, motor block, duration of analgesia, sedation and adverse effects

**Aims and Objectives:** (1) To evaluate the analgesic efficacy of clonidine and butorphanol as an adjuvant to levobupivacaine. (2) To assess the onset and duration of sensory and motor block, duration of postoperative analgesia, visual analog score (VAS) scoring and the requirements of rescue analgesia.

**Methodology:** A prospective randomized study was carried out which included 60 adult patients between the ages of 18-65 years of ASA 1 and 2 who underwent upper limb surgeries. Group A received 30 ml of 0.5% levobupivacaine with 40mcg clonidine and group B received 30 ml of levobupivacaine with 2 mg of butorphanol via supraclavicular approach. Onset, duration of sensory and motor block, duration of analgesia was observed. All patients were observed in post anesthesia care unit and received tramadol injection 100mg IV in 100ml normal saline as soon as they compared of pain as rescue analgesic. Duration of analgesia was taken as the time from placement of block till the injection of rescue analgesic.

**Result:** Duration of block and analgesia was prolonged in group A compared to group B and it is statistically highly significant.

**Conclusion:** Clonidine as an adjuvant with 0.5% levobupivacaine is more effective in prolonging the duration of sensory and motor block and the duration of analgesia when compared to butorphanol as an adjuvant to 0.5% levobupivacaine.



## Introduction

Supraclavicular brachial plexus block is an established regional anaesthetic technique for upper limb surgeries. Supraclavicular approach gives the most effective block for all portions of upper extremity and is carried out at the level of trunk of brachial plexus. It is being routinely and efficiently used as an alternative to general anesthesia for upper limb surgeries. Local anesthetics alone will have shorter duration of analgesia. A variety of local anesthetics (LAs) have been studied for brachial plexus blockade. Levobupivacaine is S-enantiomer of bupivacaine belonging to an amino-amide group, having favourable clinical profile and margin of safety with respect to both cardiovascular system (CVS) and central nervous system effects compared with racemic bupivacaine.[2] It has a long duration of action, having similar pharmacology to bupivacaine, however, it has a wider safety margin and was shown to possess less cardiotoxicity in comparison with bupivacaine. The decreased toxicity of levobupivacaine is attributed to its faster protein binding rate. A variety of adjuvants have been added to improve the quality of block, reduce the total dose of local anesthetics used, and to reduce

the need for supplementary postoperative analgesia. Several combinations of LAs and various adjuvants such as morphine, tramadol, buprenorphine, clonidine, dexamethasone, fentanyl, and butorphanol have been used in various studies. Alpha 2 agonist have been used widely as an adjuvant in view of their sedative, analgesic, perioperative sympatholytic in cardiovascular stabilizing effects with reduced analgesic requirement. We have used levobupivacaine along with clonidine and butorphanol as an adjuvant in our study. Butorphanol is a synthetic opioid antagonist of the phenanthrene series acting as an analgesic. It exhibits partial agonist and antagonist activities at the μ-opioid receptor and agonistic activity at κ-receptors. Alpha 2 agonist have been used widely as an adjuvant in view of their sedative, analgesic, perioperative sympatholytic in cardiovascular stabilizing effects with reduced analgesic requirement. These agents can be safely administered via intrathecal, epidural and intravenous route either alone or combined with other drugs prolonging the duration of anesthesia and density of block. The use of clonidine, a partial α2 adrenoreceptor agonist, in peripheral nerve blocks, has been reported to be safe and beneficial (prolongs the duration of anesthesia and analgesia).

**Methodology**

- 60 patients were studied in the Department of Anaesthesiology at Gandhi Medical College, Bhopal after approval of the Institutional Ethics Committee and informed consent of participants.
  The patients were assigned into 2 groups: Group A - 30 patients received 30 ml of 0.5% levobupivacaine with 40mcg of clonidine Group B - 30 patients received 30 ml of 0.5% levobupivacaine with 2 mg of butorphanol.

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| ASA I and II | Refusal from patient. |
| Age between 18-60 years. | History of local anesthetic allergy. |
| Patients undergoing upper limb surgeries. | |

**Procedure**

Patient is shifted inside the OT and standard monitors was established and their baseline values were measured. Supraclavicular nerve plexus block was performed with respective study drugs under nerve stimulator guidance after local infiltration of 1 ml of 2% lignocaine subcutaneously. Immediately after injecting the drugs, the patients were asked Every 5 min about the pain relief, Loss of pin prick sensation and Ability to move the upper limb to assess the onset and quality of analgesia, Sensory and motor block respectively and the patients were observed in post anesthesia care unit and received tramadol injection 100mg IV in 100ml normal saline as soon as they complained of pain as rescue analgesic. Severity of pain is assessed using VAS score post operatively.

**Visual Analogue Pain Scale**

Grade 0 (0-1): Good analgesia

Grade 1 (1-4): Moderate analgesia

Grade 2 (4-7): Mild analgesia

Grade 3 (7-10): No analgesia

Grade 4 (10): Worst pain imaginable

**Data Analysis:** Normally or continuously distributed data (hemodynamic parameters), the studied groups were compared using student's unpaired t-Test. Non- parametric data such as VAS score - Mann-Whitney U test. A P-value $< 0.05$ was considered to be significant

**Result**

There was no statistically significant difference between the demographic profile (age, sex ratio and body weight) of the two groups. The groups were also similar with regard to duration and type of surgery ($p>0.05$).

**Table 1: Showing demographic characteristics (age, ASA and BMI) between groups**

| Variables | Levobupivacaine + Clonidine (LC=30) | Levobupivacaine + Butorphenol (LB=30) |
|---|---|---|
| Age | 42(28-59) | 51(26-61) |
| Male | 15(50%) | 19(63%) |
| Female | 15(50%) | 11(37%) |
| ASA Grade-1 | 10(33%) | 11(37%) |
| ASA Grade -2 | 20(67%) | 19(63%) |
| BMI | 26 | 25 |

**Table 2: Showing the Comparison of onset, duration of sensory blockade, motor blockade and duration of analgesia and its P value among clonidine and butorphanol groups.**

| | Levobupivacaine + Clonidine (LC=30) | Levobupivacaine + Butorphenol (LB=30) | P-value |
|---|---|---|---|
| Onset of sensory block | 8.04 ± 0.65 | 12.57 ± 3.5 | < 0.05 |
| Onset of motor block | 14.3 ±1.2 | 16.76 ± 1.3 | < 0.05 |
| Duration of sensory block | 462.67 ± 71.3 | 396.23 ± 90.5 | < 0.05 |
| Duration of motor block | 418.40 ± 73.8 | 305.60 ± 66.6 | < 0.05 |
| Duration of analgesia | 511.73 ± 128.6 | 430.40 ± 68.8 | < 0.05 |

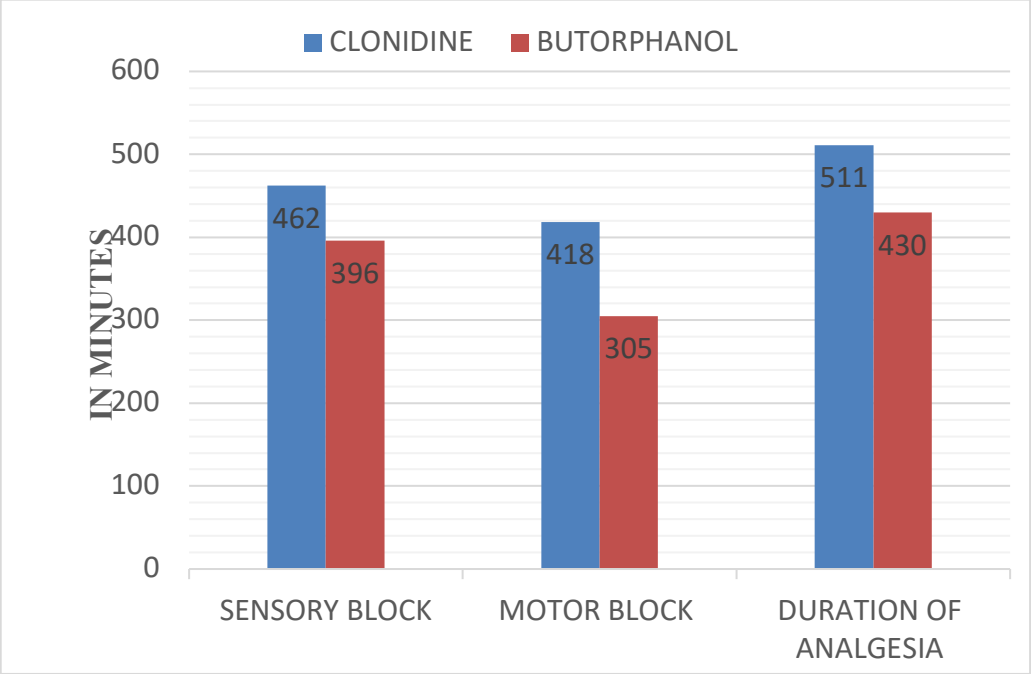


**Figure 1: Comparison of duration of sensory blockade, motor blockade and duration of analgesia among clonidine and butorphanol groups**

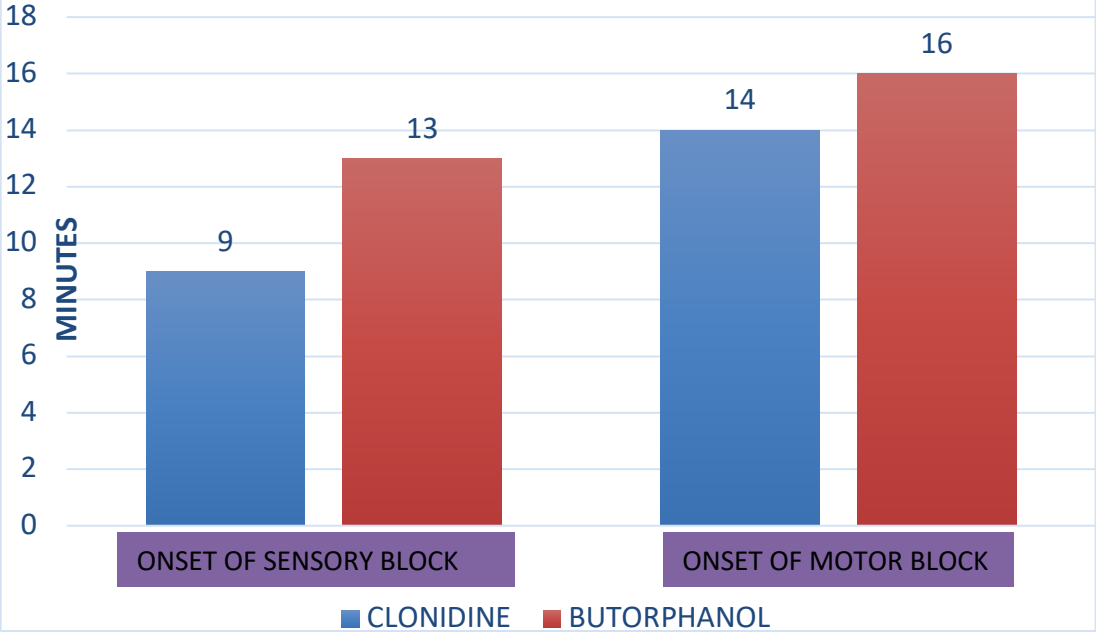


**Figure 2: Comparison of onset and duration of sensory and motor block**

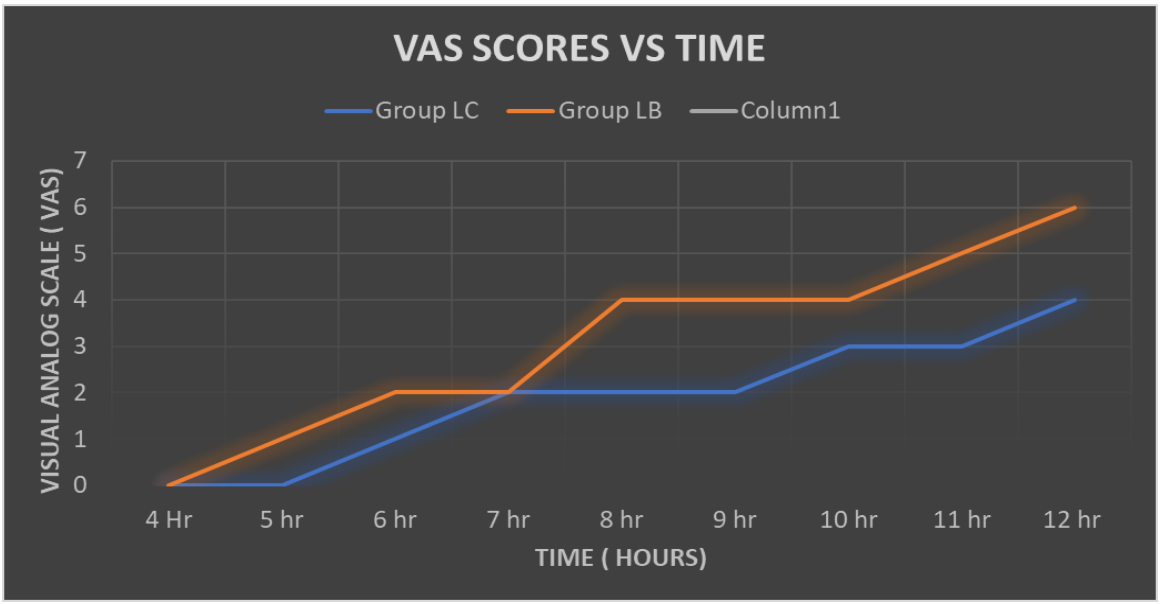


**Figure 3: Comparison of VAS score between two groups at various time points**

There was no statistically significant difference between the two groups in demographic characteristics (age and ASA). Onset of sensory block and motor block, duration of analgesia is compared between Clonidine (LC) and butorphanol (LB). All these parameters are effective in Group B (LC) compared with Group B(LB) with significant P value of less than 0.05.

## Discussion

A prospective study was conducted in the Department of Anaesthesiology, GMC after obtaining approval from institutional ethics committee and informed consent from participants. Totally 60 patients were included in the study. These 60 patients were divided into two groups group A and group B comprising of 30 patients each. Group A patients received 30 ml of 0.5 % levobupivacaine with 40 microgram of clonidine group B patients received 30 ml of 0.5 % levobupivacaine with 2mg of butorphanol.

Duma et al conducted a study about clonidine, a selective α2-adrenergic agonist which has analgesic, sedative effects and recorded the onset and duration of sensory and motor block and duration of analgesia which were found to be similar to our study.

Bharathi et al conducted a study in which the role of butorphanol as an adjuvant to local anaesthetic agents in supraclavicular nerve plexus block has been extensively studied and the results were found to be similar to our study.

Cox et al had compared bupivacaine and levobupivacaine in brachial plexus block. They found that 0.25% levobupivacaine had slower onset, shorter maintenance and a lower overall success rate than the other two groups (0.5% levobupivacaine, 0.5% bupivacaine) with a success rate of 65 to 80% in relation to the anaesthesia technique. The study also found levobupivacaine to be more appropriate for brachial plexus block due to its lower toxic potential than bupivacaine and is expected to increase the safety margin in regional anaesthesia.12 In a study by Singelyn et al, increased duration of analgesia was obtained with increasing dose of clonidine (0.2, 0.3, 0.4, 0.5, 1 µg/kg, 1.5 µg/kg). In yet another study by Singelyn, et al it was concluded that the minimum dose of clonidine required to significantly prolong the duration of analgesia after brachial plexus block.

## Conclusion

Addition of clonidine to levobupivacaine for supraclavicular nerve plexus block has faster onset of action of sensory block and motor block, duration of analgesia when compared to butorphanol along with levobupivacaine.

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