

## Original Research

### A randomised study of adjuvants for supraclavicular brachial plexus block by comparing Clonidine and Dexamethasone

<sup>1</sup>Vishal Chandrapalsingh Hajari, <sup>2</sup>Gaurav Gupta

<sup>1</sup>Associate Professor, Department of Anaesthesiology, Gouri Devi Institute of Medical Sciences, Durgapur, West Bengal, India;

<sup>2</sup>Assistant Professor, Department of Orthopaedics, Gouri Devi Institute of Medical Sciences, Durgapur, West Bengal, India

#### ABSTRACT:

**Aim:** This prospective study of adjuvants for supraclavicular brachial plexus block by comparing Clonidine and Dexamethasone. The aim was to ascertain which of them is a better adjuvant. **Materials and Methods:** This prospective, randomized study was carried out in the Department of anesthesia. Study population was randomized to 2 groups of 60 patients each. Group 1 was given 5 ml of 2% lignocaine and 15 ml 0.5% bupivacaine with 8mg dexamethasone. Group 2 received 5ml 2% lignocaine and 15 ml 0.5% bupivacaine with 0.150 mg clonidine. Time to establishment of sensory & motor block, duration of analgesia and any adverse effects were observed. **Results:** Onset of sensory blockade was at 8.13±5.14 in group 1 and 9.36±2.58 minutes in Group 2. Average time to motor block was at 9.48±3.12 minutes in Group 1 and 10.58±3.61 minutes in Group 2. Analgesia's duration in Group 1 and Group 2 was 999.2±337.5 and 880.3±283.5 minutes respectively. No major adverse events were seen in either group. **Conclusion:** Performance of dexamethasone was similar to clonidine as adjunct to local anaesthetic in subclavian perivascular approach of brachial plexus block. However, it has faster sensory and motor blockade's onset. Analgesia's duration observed was found to be longer, though the difference was statistically insignificant.

**Keywords:** Adjuvants, Supraclavicular brachial plexus, Clonidine, Dexamethasone

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**Corresponding author:** Gaurav Gupta, Assistant Professor, Department of Orthopaedics, Gouri Devi Institute of Medical Sciences, Durgapur, West Bengal, India

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#### INTRODUCTION

Supraclavicular brachial plexus block is a popular and widely employed regional nerve block technique for perioperative anaesthesia and analgesia for surgery of the upper extremity. The onset is rapid, predictable and provides excellent analgesia and muscle relaxation there by considerably decreasing the peri and postoperative opioid requirements.<sup>1</sup> Different drugs have been used as adjuvants with local anaesthetics in supraclavicular blocks to improve the quality and prolong the duration of anaesthesia. Various drugs like opioids (eg. Buprenorphine, Fentanyl) that have been used as additives were found to produce respiratory depression and psychomimetic effects. Thus additives with negligible side effects are looked for. Dexamethasone, a steroid, is a fluorinated derivative of prednisolone and an isomer of betamethasone has been shown to prolong duration of

peripheral nerve blocks when mixed with local anesthetic in previous studies. Similar results have also been obtained with clonidine a centrally acting selective  $\alpha_2$  adrenergic agonist.<sup>2</sup> There has been many studies comparing the efficacy of these two adjuvants along with bupivacaine, but not many studies have been done comparing these two additives in supraclavicular block. hence, we aim to compare the efficacy of dexamethasone and clonidine as an adjuvant to 0.5% bupivacaine in ultrasound guided supraclavicular brachial plexus block for upper limb surgeries.

#### MATERIAL AND METHODS

This prospective, randomized study was carried out in the Department of anesthesia, after taking the approval of the protocol review committee and institutional ethics committee. 120 patients, ASA

physical status I-III, 16 years of age or older, weighing between 35-85 kg undergoing surgery of the upper limb, were enrolled. 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 were excluded from the study. Patients already on drugs with psychotropic or adrenergic activities and patients receiving chronic analgesic therapy were also excluded. No other sedative medication was administered in the first hour after injecting the study dose. The patients were randomized into 2 groups using computer generated random numbers by using winpepi software as Group 1 and Group 2. Intravenous cannulation was done in the opposite arm using 18 G cannula. Anxiolysis was obtained with Inj. midazolam 1.0 mg intravenously. Parameters observed were electrocardiogram (ECG), heart rate; non-invasive blood pressure (NIBP) and oxygen saturation (SpO<sub>2</sub>) using pulse oximetry. Supraclavicular block was then performed under ultrasound guidance. In plane technique was used after proper visualization of the brachial plexus. Group 1 received 5 ml 2% lignocaine with adrenaline and 15 ml 0.5% bupivacaine with 8mg dexamethasone and Group 2 received 5 ml 2% lignocaine with adrenaline and 15 ml 0.5% bupivacaine with 0.150 mg clonidine. The block was assessed for onset of sensory and motor blockade and duration of analgesia. Onset of sensory blockade was the time in minutes between injection and complete abolition of pin prick response in 3 nerve areas (Median, Radial and Ulnar nerves). Onset of motor block was the time in minutes between the drug injection and complete absence of voluntary movement of the limb. Anaesthesia in only some dermatomal areas was termed as patchy block and in

failed block there was no block at all. Wait time was at least 30 minutes to declare a failed block. In patchy and failed block patient's surgery was preceded with general anaesthesia. The average duration of surgery was 2 hours. Visual Analogue Score (VAS) was used for assessment of analgesia. Duration of analgesia was the time in minutes between onset of sensory blockade and reappearance of considerable pain as assessed by (VAS score >3) and demand for rescue analgesics. Fentanyl in the dose of 3mcg/kg was used as a rescue analgesic. Any significant hemodynamic changes, sedation, drug adverse effects and block related complications were looked for. Demographic data and onset of sensory and motor block and duration of analgesia were compared between the two groups.

## RESULTS

Study enrolled 120 patients which were analysed. Two groups were similar in respect to age and weight (Table 1). Table 2 summarises analysis of effect of block. Sensory and motor blockade's onset was faster in Group 1 (6.23 minutes and 7.48 minutes) as compared to Group 2 (7.36 minutes and 8.58 minutes respectively), p value 0.107 and 0.106. Rapid sensory and motor blockade was found in Group 1; though the difference was not statistically significant. The length of analgesia was 997.2 minutes in Group 1 and in Group 2 was 878.3 minutes. Dexamethasone had longer duration of analgesia; p value being 0.06. No adverse effects were seen in group 1 patients. Three patients in group 1 had bradycardia which was immediately resolved with injection Atropine 1 ampoule intravenously. Four patients in group 2 made complaints of nausea which was treated with Injection ondansetron 4mg intravenously. No major side effects were noted in both the groups. There were no block related complications in either of the groups.

**Table 1: Age and weight of patients**

	Group 1	Group 2	P Value
Age (Years)	34.39±12.10	33.84±11.36	>0.05
Weight (KG)	55.12±14.61	56.07±13.89	>0.05

**Table 2: Block characteristics**

	Group 1		Group 2		P Value
	Mean	SD	Mean	SD	
Onset of sensory blockade (minutes)	6.23	3.24	7.36	1.68	0.107
Onset of Motor Blockade (minutes)	8.48	3.22	10.58	2.71	0.106
Duration of analgesia (minutes)	999.2	337.5	878.3	283.5	0.07

## DISCUSSION

Supraclavicular blocks are performed at level of the brachial plexus trunks. Almost entire sensory, motor and sympathetic innervations of the upper extremity are located in three nerve structures (trunks), restricted within small surface area. Therefore, this block has fast onset, predictable and dense blockade and good success rate.<sup>3</sup> In this study, we compared

clonidine and dexamethasone as adjuvants. We found that by adding dexamethasone to bupivacaine, onset of sensory block and the duration of analgesia can be mildly increased but the results were statistically insignificant when compared with clonidine and also the onset of motor blockade was faster with dexamethasone than clonidine. Even if injecting clonidine as the individual analgesic into the brachial

plexus sheath does not provide clinically related analgesia, it has been confirmed to slow down the action potential of A and C fibers in de-sheathed sciatic nerves.<sup>4</sup> Clonidine being a lipophilic drug, much gets absorbed systemically after perineural administration resulting in sedation. Some studies reported significant sedation with use of clonidine rather with plain local anaesthetic. Sedation was not assessed in this study as all patients were administered the premedication with midazolam and therefore could alter the outcome.<sup>5,6</sup> In the current study, Dexamethasone was more effective as adjunct to local anaesthetic when compared with clonidine. We noted that by adding dexamethasone, the onset of sensory and motor blockade was faster. The duration of analgesia was prolonged and thereby reducing the need for postoperative opioid and NSAID use although it was not statistically significant. Many other studies have also indicated that dexamethasone added with bupivacaine prolongs the duration of analgesia.<sup>7</sup> Low- to moderate quality evidence suggests that when used as an adjuvant to peripheral nerve block in upper limb surgery, both perineural and intravenous dexamethasone may prolong duration of sensory block and are effective in reducing postoperative pain intensity and opioid consumption.<sup>8</sup> Zhang et al.<sup>9</sup> found addition of combined perineural dexmedetomidine and dexamethasone to ropivacaine for intercostal nerve block seemed to be an attractive method for prolonged analgesia with almost no adverse effects. Saied et al.<sup>10</sup> claimed that for brachial plexus blocks, epinephrine did not affect the duration of analgesia when added to ropivacaine. Epinephrine did not enhance the observed increase of block duration induced by clonidine or the combination of clonidine and dexamethasone. The most block duration enhancement was observed when combination of clonidine and dexamethasone were added to ropivacaine. Our study summarizes that the addition of dexamethasone with bupivacaine enhances the supraclavicular brachial plexus block quality in upper limb surgeries by a more rapid onset and increased duration of sensory and motor blockade, improving postoperative analgesia. Using a fixed dose of clonidine and dexamethasone was the main limitation of the study.<sup>11</sup>

## CONCLUSION

The study suggests that dexamethasone and clonidine are effective adjuncts to local anaesthetics in supraclavicular brachial plexus block. Though we could not prove significant difference in using one

over the other in all block perspectives, dexamethasone added to bupivacaine is an excellent option for improving the quality and duration of supraclavicular brachial plexus block in upper limb surgeries.

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