

A randomized prospective study of the efficacy of dexamethasone or clonidine as an additive to local anaesthetic for supraclavicular block for upper limb surgeries in a tertiary care hospital

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Abstract

Background: Supraclavicular brachial plexus block is one of the most regular techniques of regional anaesthesia employed for upper limb surgeries. In observation of prolonging the sensory block and duration of block, different adjuvants have been tried with varying degrees of success. Dexamethasone and Clonidine are two such adjuvants which have been established to be suitable as adjuvants in various studies. The practice of combining additives to local anaesthetics used in peripheral nerve blocks carries lot of advantages. We compared the outcome of dexamethasone or clonidine as adjuvant to local anaesthetic in supraclavicular brachial plexus block in an attempt to obtain the better adjuvant amongst both. **Methods:** In this prospective, randomized study, 2 groups of 30 patients each were investigated, using 10 ml 2% lignocaine with 1:200000 adrenaline and 20 ml 0.5% bupivacaine with 8mg dexamethasone for group 1. Group 2 received 10 ml 2% lignocaine with 1:200000 adrenaline and 20 ml 0.5% bupivacaine with 0.150 mg clonidine. The observed parameters were onset of sensory and motor blockade, the duration of analgesia and occurrence of any side effects. Data were subjected to statistical analysis using open epi.com. Student t test was used to analyse the quantitative variables. Qualitative variables were analyzed using Chi square test. $P < 0.05$ was considered statistically significant. **Results:** the onset of sensory block was 7.63 ± 4.14 in group 1 and 9.36 ± 2.58 minutes in Group 2 respectively. Mean onset of motor block was 7.98 ± 3.12 Groups 1 and 10.52 ± 3.61 minutes in Group 2 respectively. Duration of analgesia in Groups 1 and Group 2 were 798.2 ± 378.5 and 679.3 ± 354.5 minutes respectively. There was no major side effects were noted in two groups. **Conclusion:** Dexamethasone might be a superior additive to local anaesthetic than clonidine in supraclavicular block as it produces earlier onset of sensory and motor block. Longer duration of analgesia was also noted, though the variation is not statistically significant in this study.

Key Word: Dexamethasone, clonidine, Supraclavicular block, surgery

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Received Date: 25/11/2018 Revised Date: 12/12/2018 Accepted Date: 03/01/2019

DOI: <https://doi.org/10.26611/10159213>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
14 February 2019

INTRODUCTION

The supraclavicular brachial plexus block provides anaesthesia of the intact upper extremity in the most reliable and time-efficient approach. Since the '80s, clonidine has been used as an adjunct to local anaesthetic agents in different local techniques to make longer the duration of block. The outcomes of earlier studies on the efficacy of clonidine on brachial plexus block have been varied. Several studies have revealed that clonidine prolongs the effects of local anaesthetics¹. Outstanding analgesia and operating conditions make this a

How to cite this article: Pradeep Kumar Das, Pratheek R Reddy, M Madhu Chaitanya. A randomized prospective study of the efficacy of dexamethasone or clonidine as an additive to local anaesthetic for supraclavicular block for upper limb surgeries in a tertiary care hospital. *MedPulse International Journal of Anesthesiology*. February 2019; 9(2): 145-148. <http://medpulse.in/Anesthesiology/index.php>

enormously accepted method. The features of this block consist of rapid onset, conventional and opaque Anaesthesia all along with elevated batter rates². Peripheral nerve blocks avoid the unnecessary effects of the anaesthetic drugs worn through general anaesthesia and the stress of laryngoscopy and tracheal intubation with an further benefit of decreased postoperative opioid necessities³. Currently diverse drugs have been worn as adjuvants with local anaesthetics in supraclavicular blocks to get better the class of anaesthesia. Different drugs like opioids (eg. Buprenorphine, Fentanyl) that have been worn as additives were found to generate respiratory depression and psychomimetic effects³. Thus additives with negligible side effects are looked for Dexamethasone, a steroid, is a fluorinated derivative of prednisolone and an isomer of betamethasone and a readily available drug⁴. Studies by means of clonidine, a centrally acting selective α -adrenergic 2 agonist, in central and peripheral blockade explain that it has analgesic properties while used by means of local anaesthetics in epidural, intrathecal or peripheral blocks⁵. The aim of the present study was to evaluate the outcome of dexamethasone or clonidine as adjuvant to local anaesthetic in supraclavicular brachial plexus block in an attempt to obtain the better adjuvant amongst both.

METHODS

The study protocol of this prospective, randomized study conducted at Department of Anaesthesia, Great eastern medical school and hospital the study was approved by the Institutional Ethics Committee. All participants gave written informed consent. 60 patients, ASA physical status I-III, 18 years of age or older, weighing between 30-80 kg undergoing surgery of the upper limb, were recruited. Excluded from the study were 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. Pre-medication was given with tablet *alprazolam* 0.25 mg orally at 22:00 h on the night before surgery and at 06:00 h on the morning of the surgery. No additional sedative medication was administered in the first 60 min after injection of 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 1.5 mg

intravenously. Electro cardiogram (ECG), heart rate; non invasive blood pressure (NIBP) and oxygen saturation (SpO₂) using pulse oximetry were monitored. Supraclavicular block was then performed under nerve stimulator guidance. The puncture point was identified as lateral to the pulsation of subclavian artery and 1 cm above the midpoint of clavicle. Nerve localization was achieved by means of a nerve locator connected to a 22 G, 50-mm insulated needle. Initially a current of 2 mA was used and then slowly reduced. Proper needle placement was taken as flexion of the digits with an output of 0.5 mA. Group 1 received 10 ml 2% lignocaine with adrenaline and 20 ml 0.5% bupivacaine with 8mg dexamethasone and Group 2 received 10 ml 2% lignocaine with adrenaline and 20 ml 0.5% bupivacaine with 0.150 mg clonidine. The block was analysed for onset of sensory and motor block and duration of analgesia. Onset of sensory block 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 certain dermatomal areas was taken as patchy block and in failed block there was no block at all. We waited for at least 45 minutes (min) to declare failed block. In patchy and failed block patients surgery was preceded with general anaesthesia and endotracheal intubation. The average duration of surgery was 2 hours. Analgesia was assessed using Visual Analogue Score (VAS). Duration of analgesia was the time in minutes between onset of sensory block and reappearance of considerable pain as assessed by (VAS score >3) and demand for rescue analgesia. Injecting tramadol 2mg/kg intramuscularly was given as rescue analgesic. Any significant hemodynamic changes, sedation, drug side 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. Statistical analysis of the data collected was done by chi square test and t-test using the computer online software www.epi.com. P values <0.05 was considered as statistically significant.

RESULTS

A total of 69 patients were chosen for the study. 9 patients were disqualified from the study in view of failed/patchy block. The data collected from all the 60 patients incorporated in the study were analyzed. There were no differences between the two groups regarding age and weight (Table 1) or the site of surgery

Table 1: Demographic Data

Data	Group1	Group2	P Value
Age in Years	33.29±13.10	32.84±12.36	>0.05
Weight in KG	54.12±15.61	55.07±14.89	>0.05

Values expressed as mean±SD.

Table 2 was showing the analyses the characteristics of the block. The onset of sensory and motor block was faster in Group 1 (7.63 min and 7.98 min respectively) when compared to Group 2 (9.36 min and 10.52 min respectively), with p value 0.038 and 0.008. Statistically significant faster onset of sensory and motor block was seen in Group 1. The duration of analgesia was 798.2 min in Group 1 and in Group 2 the duration was 679.3 min.

Table2: Assessment of Block

	Group1		Group2		P Value
	Mean	SD	Mean	SD	
Onset of sensory block (mm)	7.63	4.14	9.36	2.58	0.038
Onset of Motor Block (min)	7.98	3.12	10.52	3.61	0.008
Onset of analgesia (min)	798.2	378.5	679.3	354.5	0.069

Values expressed as mean+- SD. p value less than 0.05 was statistically significant.

DISCUSSION

Supraclavicular blocks are performed at the stage of the brachial plexus trunks. Now, approximately the entire sensory, motor and sympathetic innervations of the upper extremity are conceded in just three nerve structures (trunks), restricted to a very small surface area. As a result, typical features of this block include rapid onset, predictable and dense anaesthesia along with its elevated success rate⁶. In this study, we compared clonidine and dexamethasone as adjuvants to local anaesthetic. We found a mild difference in the onset of sensory block by adding dexamethasone to bupivacaine the duration of analgesia can be increased but the results were not statistically significant when compared with clonidine and also the onset of motor block was faster with dexamethasone than clonidine. This finding is similar to many studies done previously⁵. yet 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 nerves⁷. As clonidine is a lipophilic drug, much of it gets captivated systemically after perineural administration, consequential in sedation. Other studies reported significant sedation through the use of clonidine than with plain local anaesthetic. Sedation was not particularly studied in this study as all patients were premeditated with midazolam and therefore could obstruct with the outcome^{8,9}. In the present study, Dexamethasone was more effective in adjuvant to local anaesthetic when

Duration of analgesia was longer with dexamethasone. p value was 0.069 and so it was not statistically significant. The cardiovascular parameters monitored were NIBP and heart rate. No side effects were reported by group 1 patients. One patient in group 2 had bradycardia which responded to inj. Atropine 0.6mg IV. Four patients in group 2 complained of nausea during surgery which was relieved on giving Inj. ondansetron 4mg IV. Two patients in group 2 were sedated but was easily rousable. No major side effects were noted in both the groups. There were no block related complications in either of the groups.

compared with clonidine. We note, though, that by adding up dexamethasone, the onset of sensory and motor block was faster. The duration of analgesia was extended and thereby reducing the need for postoperative opioid use although we could not prove any statistically significant persistence. Many other studies have also supported the fact that dexamethasone worn with bupivacaine prolongs the time of analgesia¹⁰. To summarize our study suggests that the improvement of dexamethasone with bupivacaine enhances the quality of supraclavicular brachial plexus block in upper limb surgeries by a faster onset and prolonged duration of sensory and motor block, enhancing post-operative analgesia. One limitation of our study was the use of fixed dose of clonidine and dexamethasone and also suggests that additional trials have to be done for comparing dexamethasone and clonidine, as adjuvants in supraclavicular brachial plexus block using ultrasound guidance with more sample size of more precise block and hence lesser volumes of local anaesthetic.

CONCLUSION

The study suggests that dexamethasone and clonidine are effective adjuvants to local anaesthetics in supraclavicular block. Though we could not demonstrate superiority of one over the other in all block characteristics, dexamethasone added to bupivacaine is an attractive option for improving the quality and duration of supraclavicular block in upper limb surgeries

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Source of Support: None Declared
Conflict of Interest: None Declared