



## *“Dexamethasone or Clonidine – Which is the better additive to Local Anaesthetic for Supraclavicular Block*

### KEYWORDS

#### Dr Fijul Komu

Assistant Professor in Anaesthesiology, Medical College, Kozhikode -673 008

#### Dr Bindu Meleveetil

Associate Professor in Anaesthesiology, Medical College, Kozhikode -673 008

#### Dr Radha K R

Additional Professor in anaesthesiology, Medical College, Kozhikode -673 008

#### Dr Usha Kumari R

Associate Professor in Anaesthesiology, Medical College, Kozhikode -673 008

#### Dr Shiril Ashraf

Senior Resident, Department of Anaesthesiology, Medical College, Kozhikode -673 008

#### ABSTRACT

**Background:** Brachial plexus block is an often used Regional Anaesthesia technique by the Anaesthesiologist either as an adjuvant to general anesthesia or as a sole anesthesia modality for upper limb surgeries. In view of prolonging the sensory block and duration of block, various adjuvants have been tried with varying degrees of success. Dexamethasone and Clonidine are two such adjuvants which has been found to be suitable as adjuvants in various studies. We compared the effect of dexamethasone or clonidine as adjuvants to local anaesthetic in supraclavicular brachial plexus block in an effort to elicit the better adjuvant amongst both.

**Methods:** This trial was conducted in a tertiary care centre on a group of fifty patients requiring elbow, forearm or hand surgeries. They were randomized into two groups of 25 each. Supraclavicular block was performed using nerve stimulator guidance. Group 1 received 20 ml 2% lignocaine with 1:200000 adrenaline and 10 ml 0.25% bupivacaine with 8mg dexamethasone. Group 2 received 20 ml 2% lignocaine with 1:200000 adrenaline and 10 ml 0.25% bupivacaine with 0.150 mg clonidine. The observed parameters were onset of sensory and motor blockade, the duration of analgesia and presence of any side effects. Data were subjected to statistical analysis using SPSS version 16. Students t test was used to analyse the quantitative variables. Qualitative variables were analysed using Chi square test.  $P < 0.05$  was considered statistically significant.

**Results:** Mean onset of sensory block was 6.36+2.09 and 8.16+2.34 minutes in Group 1 and Group 2 respectively. Mean onset of motor block was 8.16+2.17 and 9.96+2.45 minutes in Groups 1 and Group 2 respectively. Duration of analgesia in Groups 1 and Group 2 were 835.2+287.0 and 698.2+214.4 minutes respectively. No major side effects were noted in both the groups.

**Conclusion:** Dexamethasone may be a better 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 difference is not statistically significant in this study.

#### INTRODUCTION

Supraclavicular brachial plexus block also known as the “Spinal Anaesthesia of the arm” is a popular and widely employed regional nerve block technique for surgery of the upper extremity. Excellent analgesia and operating conditions make this a very popular technique. The features of this block include rapid onset, predictable and dense Anaesthesia along with high success rates. <sup>(1)</sup> Peripheral nerve blocks avoids the unwanted effects of the anaesthetic drugs used during general anaesthesia and the stress of laryngoscopy and tracheal intubation with an added advantage of decreased postoperative opioid requirements. <sup>(2)</sup>

Unfortunately, single injection of local Anaesthetics alone limits the duration of the block. Prolonged analgesia with regional nerve blocks can be achieved either by the use of continuous catheter techniques or using appropriate adjuvants. Perineural indwelling catheter techniques can effectively prolong the duration of blockade, but it is unfamiliar to most practitioners and technically difficult, the increased financial burden to the patient being another hindrance. An adjuvant that can prolong local Anaesthetic action after single injection peripheral nerve block with minimal side effects addresses most of these problems. Nowadays different drugs have been used as adjuvants with local anaesthetics in supraclavicular blocks to improve the quality of anaesthesia. Various drugs like opioids (eg. Buprenorphine, Fentanyl) that have been used as additives were found to produce respiratory depression and psychomimetic effects. <sup>(3)</sup> Thus additives with minimal side effects are looked for.

Dexamethasone, a steroid, is a fluorinated derivative of prednisolone

and an isomer of betamethasone and a readily available drug. <sup>(4)</sup> Studies using clonidine, a centrally acting selective  $\alpha_2$  adrenergic agonist, in central and peripheral blockade show that it has analgesic properties when used with local anaesthetics in epidural, intrathecal or peripheral blocks. <sup>(5)</sup>

#### METHODS

This was a prospective randomized study conducted in the Department of Anaesthesia of a tertiary referral centre. After obtaining approval of hospital ethical committee and written informed consent, 50 patients belonging to American Society of Anaesthesiologist Physical Status I, II aged between 18-60 years, weighing between 30-80 kg posted for forearm and hand surgeries were selected. Exclusion criteria were refusal to regional anaesthesia, known allergy to local anaesthetics, dexamethasone or clonidine, patients having diabetes mellitus, hypertension or chronic obstructive pulmonary disease and coagulopathies. Those with failed and partial blocks were also excluded from the study.

Patients were kept fasting for 8 hours. 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. Electrocardiogram (ECG), heart rate, non invasive blood pressure (NIBP) and oxygen saturation (SpO<sub>2</sub>) 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 using a nerve locator connected to a 22 G, 50-mm insulated needle. Initially a current of 2 mA was used and then gradually reduced. Proper needle placement was taken as flexion of the digits with an output of 0.5 mA. Group 1 received 20 ml 2% lignocaine with adrenaline and 10 ml 0.25% bupivacaine with 8mg dexamethasone and Group 2 received 20 ml 2% lignocaine with adrenaline and 10 ml 0.25% 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 proceeded 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. Inj. 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 software SSPS version 16. P values <0.05 was considered as statistically significant.

**Results:-**

A total of 62 patients were selected for the study. 12 patients were disqualified from the study in view of failed/patchy block. The data collected from all the 50 patients included in the study were analysed. Both groups were comparable with respect to age and weight [Table 1].

Table 1. Demographic Data

DATA	GROUP 1	GROUP2	P value
AGE IN YEARS	34.44+-11.13	33.64+-11.71	>0.05
WEIGHT IN KG	57.04±13.40	57.84+-11.94	>0.05

Values expressed as mean +-SD.

Table 2 analyses the characteristics of the block. The onset of sensory and motor block was faster in Group 1 (6.36 min and 8.16 min respectively) when compared to Group 2 (8.16 min and 9.96 min respectively), with p value 0.036 and 0.009. Statistically significant faster onset of sensory and motor block was seen in Group 1. The duration of analgesia was 835.2 min in Group1 and in Group 2 the duration was 698.2 min. Duration of analgesia was longer with dexamethasone. p value was 0.072 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. Three patients in group 2 complained of nausea during surgery which was relieved on giving Inj. ondansetron 4mg IV. Three 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.

Table 2. Assessment of Block

	GROUP 1		GROUP 2		P VALUE
	Mean	SD	Mean	SD	
ONSET OF SENSORY BLOCK (min)	6.36	2.09	8.16	2.34	0.036
ONSET OF MOTOR BLOCK (min)	8.16	2.17	9.96	2.45	0.009
DURATION OF ANALGESIA (min)	835.2	287.0	698.2	214.4	0.072

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

**Discussion:-**

Supraclavicular block provides excellent anaesthesia and is commonly used for upper limb surgeries. It can be done by the classical method, using nerve stimulator, and USG guided technique. Despite the increasing popularity of USG guided block, the use of peripheral nerve stimulator reigns supreme in many centres due to financial constraints and to date remains a popular technique. Local anaesthetics alone provides good operative conditions but is limited by the short duration of analgesia. Indwelling catheters is a good solution for prolonging the block, but has the inherent problems of difficulties in placement, infection, secondary migration etc. Hence many adjuvants have been added to the local anaesthetic to enhance the block quality.<sup>(6)</sup> In our study, we compared clonidine and dexamethasone as adjuvants to local anaesthetic. We found that by adding dexamethasone to bupivacaine the duration of analgesia can be increased but the results were not statistically significant. The onset of sensory block and motor block was faster with dexamethasone than clonidine. This finding is similar to many studies done previously.<sup>(5)</sup>

Even though injecting clonidine as the sole analgesic into the brachial plexus sheath does not provide clinically relevant analgesia, it has been demonstrated to inhibit the action potential of A and C fibers in de-sheathed sciatic nerves.<sup>(7)</sup> Many authors favor the hypothesis that clonidine exerts its local anesthetic-prolonging effect directly on the nerve fiber, as a result of complex interaction between clonidine and axonal ion channels thereby increasing the threshold of action potential and blockade of nerve conduction. Peripheral antinociception induced by clonidine has also been related to A-adrenoceptor-mediated local release of enkephalin-like substances.<sup>(8)</sup>

Various studies have been done using dexamethasone as an adjuvant along with local anesthetic in supraclavicular brachial plexus block. The possible mechanism of action of dexamethasone as an adjuvant is due to its local action on nociceptive C fibers which is mediated via membrane associated glucocorticoid receptors and the up-regulation of potassium channels in excitable cells.<sup>(10)</sup>

In the present study, we compared clonidine and dexamethasone as an adjuvant to local anaesthetic and it was found that by adding dexamethasone, the onset of sensory and motor block was faster. The duration of analgesia was prolonged and thereby reducing the need for postoperative opioid use though we could not prove any statistically significant prolongation. Many other studies have also supported the fact that dexamethasone used with bupivacaine prolongs the duration of analgesia.<sup>(ii)</sup>

To summarise our study showed the advantage of dexamethasone over clonidine by producing faster onset of sensory and motor block. We may get more definite results regarding duration of analgesia if we increase the sample size and collect some more data besides the ones presented in our study. One limitation of our study was the use of fixed dose of clonidine and dexamethasone. We also suggest that further trials need to be done for comparing dexamethasone and clonidine, as adjuvants in supraclavicular brachial plexus block.

using ultrasound guidance giving the advantage of more precise block and hence lesser volumes of local anaesthetic.

#### **CONCLUSION:-**

We found 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 had a significantly earlier onset of sensory block and motor block and better side effect profile. We conclude that dexamethasone is a better additive to local anaesthetic in supraclavicular block compared to clonidine.

#### **REFERENCE**

1. Singh.S, Agarwal.A. A randomised controlled double blinded prospective study of the efficacy of Clonidine added to Bupivacaine as compared with Bupivacaine alone in supraclavicular brachial plexus block for upper limb surgery. *Indian Journal of Anaesthesia* 2010; 54(6):552-7.
2. Shrestha BR, Maharjan SK, Shrestha S, Gautam B, Thapa C, Thapa PB, Joshi MR. Comparative study between Tramadol and Dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block. *J Nepal Med Assoc* 2007;46(168):158-64.
3. Saddichha , Sahoo BA, Subodh, B. N, Chand, Prabhat K. Sublingual Buprenorphine-Induced Psychomimetic Effects. *American Journal of Therapeutics* 2016 Jan-Feb vol 23 – issue 1: p e242-243(1)
4. Robert.K.Stoelting, Simon.C.Hillier. *Pharmacology and Physiology in Anaesthetic Practice*, 4th Edition. Lippinkot Williams and Wilkins USA:4:179-207.
5. Hari Kishore, Rajagopal P, Binu Puthur Simon, Karthika Asokan. "A Comparison between 0.5% BupivacaineDexamet-Hasone & 0.5% Bupivacaine Clonidine Combination in Brachialplexus Blocks By Supraclavicular Approach". *Journal of Evidence based Medicine and Healthcare*; Volume 2, Issue 20, May 18, 2015; Page: 3016-3024.
6. Popping DM, Elia N, Marret E, Wenk M, Tramèr MR. Clonidine as an adjuvant to local anaesthetic for peripheral nerve and plexus blocks: A meta-analysis of randomized trials. *Anesthesiology* 2009 Aug; 111(2): 406-15.
7. Asad mohammed. Clonidine as an adjuvant to ropivacaine in supraclavicular brachial plexus block. A Randomised double blind prospective study. *International journal of contemporary Medical Research*. Vol 3 issue 5 May 2016.
8. Dalle C, Schneider M, Clergue F, Bretton C, Jirounek P. Inhibition of the I(h) current in isolated peripheral nerve: a novel mode of peripheral antinociception? *Muscle Nerve*. 2001 Feb;24(2):254-61.
9. Takimoto K, Levitan ES. Glucocorticoid induction of Kv1.5 K+ channel gene expression in ventricle of rat heart. *Circ Res* 1994; 75:1006-13.
10. Kulkarni, Tarkase A S, Choudhary S A. Effect of addition of Clonidine to bupivacaine in brachial plexus block. *Pravara Med Rev* 2012 4(4)
11. Swami SS, Keniya VM, Ladi SD, Rao R. Comparison of dexmedetomidine and clonidine ( $\alpha 2$  agonist drugs) as an adjuvant to local anaesthesia in supraclavicular brachial plexus block: A randomised double-blind prospective study. *Indian J Anaesth* 2012;56:243-9