Original Research Article

Comparison of dexamethasone and clonidine as an adjuvant in ultrasound guided supraclavicular brachial plexus block: A prospective, randomized study

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Abstract

Background: Brachial plexus block is one of the most common anaesthesia techniques for surgeries of upperlimb. various adjuvants have been tried to prolong the duration of sensory and motor block with varying degrees of success. dexamethasone and clonidine are two such adjuvants which have been established as an adjuvants in various studies so we compared both dexamethasone and clonidine as an adjuvant to local anesthetic in supraclavicular brachial plexus block to know which is better amongst the two. **Material and Methods:** In this prospective randomized study 60 patients were randomized in to two groups. Patients in Group 1 received 10 ml of lignocaine with adrenaline+10 ml of 0.5% Bupivacaine+8 mg of dexamethasone. Group 2 received 10 ml of lignocaine with adrenaline+10 ml of 0.5% bupivacaine+ 75 mcg of clonidine diluted to 2 ml. The time of onset of sensory and motor block and duration of analgesia were recorded. Data were subjected to statistical analysis 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 8.63± 3.14 in group 1 and 10.36 ± 2.18 minutes in Group 2 respectively. Mean onset of motor block was 9.48± 2.12 Groups 1 and 12.32 ± 2.61 minutes in Group 2 respectively. Duration of analgesia in Groups 1 and Group 2 were 1064 ± 99.6 and 649 ± 156minutes respectively. There was no major side effects were noted in two groups. **Conclusion:** Dexamethasone is a better adjuvant compared to clonidine with local anesthetics in brachial plexus block without significant side effects

Key Words: clonidine, dexamethsone, supraclavicular block

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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.[1] 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

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local anesthetic in previous studies. Similar results have also been obtained with clonidine a centrally acting selective α2 adrenergic agonist[2]. 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 bloick. 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.

AIMS AND OBJECTIVES

The aim of this study is to compare the effect of addition of dexamethasone and clonidine to 0.5%
Bupivacaine in supraclavicular brachial plexus block in terms of:
1. Onset of sensory blockade
2. Onset of motor blockade
3. Duration of analgesia
4. Complications/ side effects if any

Review of literature:
1) Chakraborthy and others did a randomized controlled study on 70 patients who underwent upper limb surgery. Group 1 patients (35) received 25 ml 0.5%bupivacaine and 30µgm (0.2 ml) Clonidine and group 2 patients (35) received 25 ml 0.5% bupivacaine +0.2 ml saline. They concluded that addition of Clonidine to bupivacaine prolongs block and enhances brachial plexus blockade
2) Santavara Kohli and others evaluated the effects of 2 different doses of Clonidine on the duration of sensory and motor block and analgesia time. In patients who underwent upper limb surgeries.30 patients received 1microgram/kg Clonidine and another 30 patients received 2 microgram /kg Clonidine along with 30 ml of 05%bupivacaine. They concluded that higher doses of Clonidine hastened onset and prolongs the duration of analgesia but with sedative potential. They also caution the use of high dose in old age, obese patients and pts with cardio respiratory illness
3) Another study by A Kulkarni compared 0.5 ml(75µgm) Clonidine +25 ml 0.25% bupivacaine and 0.5 ml saline and 25 ml 0.25 % bupivacaine hastens the onset of sensory block and increases the duration of analgesia thereby offering better quality of intra operative analgesia without significant side effects other than sedation.
4) A systematic review was done by Christopher Noss and colleagues to find out the effectiveness of Dexamethasone as an additive to local anaesthetic in brachial plexus block. They came to a conclusion that Dexamethasone definitely prolongs the duration of analgesia regardless of the local anaesthetic and reduces the use of early post op opioid requirement.
5) Study conducted by KC Cummings and others used Dexamethasone as an adjuvant to ropivacaine and bupivacaine and compared the effect of both. They found out that Dexamethasone prolonged interscalene block more with ropivacaine than bupivacaine.
6) Dipal mahendra shah and colleagues compared addition of 150mcg Of clonidine and 8 mg dexamethasone as adjuvant to 1.5%lignocaine with adrenaline in infraclavicular brachial plexus block and concluded that addition of dexamethasone does not offer any advantage over clonidine in terms of increasing success rate ,block characteristics and post operative analgesic requirement.

MATERIALS AND METHODS

After obtaining approval from the institutional ethical committee, a prospective randomized study was undertaken at SS institute of medical sciences and research centre, Davangere, over a period of 1 year on patients posted for orthopaedic surgeries on the upper limb. Sample size was fixed at 60 with 30 patients in two groups based on previous studies.

INCLUSION CRITERIA

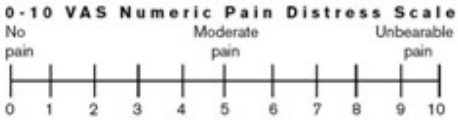
1)Patients aged between 18 and 65 years
2)weighing between 40 to 70 kgs,
3)Belonging to American Society of Anaesthesiologists grade I or II were selected.

EXCLUSION CRITERIA

1) Patient refusal for brachial plexus block
2) Hypersensitivity to local anaesthetic used in study
3) Infection at the site of injection,
4) Patients with coagulopathy and peripheral neuropathy,
5) Patient with psychiatric disorders.

After detailed preanaesthesia checkup, patients were informed about the procedure and informed consent obtained. Patients were explained about visual analogue scale. Patients were asked to be nil per mouth for 8 hours. The patients were randomized into 2 groups using computer generated random numbers as Group 1 and Group 2. patients were shifted to operation theatre. An Intravenous (IV) line was secured in the non-operating hand and Electrocardiogram (ECG), Noninvasive Blood Pressure (NIBP) and oxygen saturation by pulse oximetry (SpO2) were monitored. All patients received Inj. Midazolam 0.02 mg/kg IV as sedation and were given oxygen 5 litres/minute by Hudson mask. Under aseptic precautions, the patients were given supraclavicular brachial plexus block using high frequency linear probe 8-10 MHz of Venue 40 GE Healthcare® ultrasound machine. Patients in Group 1 received 10 ml of lignocaine with adrenaline+10 ml of 0.5% bupivacaine+8 mg of dexamethasone. Group 2 received 10 ml of lignocaine with adrenaline+10 ml of 0.5% bupivacaine+

75 mcg of clonidine diluted to 2ml. after negative aspiration of blood. The block was analysed for onset of sensory block, motor block and duration of analgesia. The Onset of sensory block was calculated as 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. Duration of analgesia was defined as the time interval from onset of block to the time when the patients began to experience nagging, uncomfortable pain (visual analogue score ≥4).Rescue analgesia was given as Inj. Diclofenac 75 mg intramuscularly.



The patients were monitored for any drug related side effects and nerve block related complications.

Statistical analysis

To compare the variables like age, sex, onset and duration of action between the two groups student 't' test was used. 'P' Value of <0.05 was accepted as indicative of statistical significance and a 'p' value of >0.05 was considered as non significant. 'P' value of <0.01 and <0.001 were considered as highly and very highly significant respectively.

RESULTS

A total of 64 patients were chosen for the study. 4 patients were disqualified from the study in view of failed/patchy block. The two groups were comparable in terms of demographic data like age and weight and gender distribution.

Table 1: Demographic data

Parameters	GROUP 1	GROUP 2
Age (in years)	41.57 ± 15.91	40.74 ± 15.05
Sex (male/female)	17/13	18/12
Weight (in kegs)	65.74 ± 9.20	66.87 ± 7.21

Table2: Assessment of Block

	Group1		Group 2		P Value
	Mean	SD	Mean	SD	
Onset of sensory block(mins)	8.63	3.14	10.36	2.18	0.034
Onset of Motor block(mins)	9.48	2.12	12.32	2.61	0.014
Duration of analgesia(mins)	1064	99.6	649.4	156	< 0.001

The onset of sensory and motor block was faster in Group 1 (8.63 min and 9.48 min respectively) when compared to Group 2 (10.36 min and 12.32 min respectively), with p value 0.034 and 0.014. Statistically significant faster onset of sensory and motor block was seen in Group 1. The duration of analgesia was 1064 mins in Group1 and 649 mins in Group 2. Duration of analgesia was longer with dexamethasone with p value<0.001 which was statistically very highly significant.

DISCUSSION

Supraclavicular block is a common procedure done for upper limb surgeries. It can be done by the classical method, using nerve stimulator guidance, and using USG guided technique. ultrasound-guided upper limb blocks has established its effectiveness and safety when compared to older techniques .Apart from using local anesthetic alone which provides good operative conditions it is limited by the short duration of analgesia. So many adjuvants have been added to the local anaesthetic to enhance the block quality. Clonidine is a α2-agonist used as an adjuvants local anesthetics. The proposed mechanism in regional anesthesia is by causing local vasoconstriction and C fibre blockade. Prolongation of anesthesia and analgesia in brachial plexus is dose dependent. Dexamethasone has been used in many studies as an adjuvant to local anesthetic. The proposed mechanism 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. Since both clonidine and dexamethasone have been used as an adjuvant with local anesthetic regularly in brachial plexus blocks to prolong the duration of analgesia, this study was conducted to compare these two drugs and to find out which among the two is a better agent. In this study, we compared Clonidine and Dexamthasone as an adjuvant to local anesthetic and it was found that by adding dexamethasone, the onset of sensory and motor block was faster and also the duration of analgesia was significantly prolonged and thereby reducing the need for post op analgesic requirement. This correlates with the study done by vierra and colleagues and the other studies. All patients in both groups were hemodynamically stable throughout intraoperative period. Hypoxia was not seen in patients due to use of supplemental oxygen by face mask. There were also no complications due to supraclavicular block as the technique was safer with ultrasound guidance. There were also no case of sensory or motor deficits persisting beyond 24 hours.

CONCLUSION

Dexamethasone has been a better adjuvant compared to clonidine with local anesthetics in brachial plexus block without significant side effects.

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