

EFFICACY OF DEXAMETHASONE AS AN ADJUVANT TO BUPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCKRakesh Nigam¹, M. Murthy², D. Kosam³, A. R. Kujur⁴**HOW TO CITE THIS ARTICLE:**

Rakesh Nigam, M. Murthy, D. Kosam, A. R. Kujur. "Efficacy Of Dexamethasone As An Adjuvant To Bupivacaine In Supraclavicular Brachial Plexus Block". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 64, August 10; Page: 11157-11163, DOI: 10.14260/jemds/2015/1607

ABSTRACT: AIMS: Brachial plexus nerve blocks have analgesic and opioid sparing benefits for upper extremity surgery. Single-injection techniques are limited by duration of local anaesthetic agents, however Continuous block techniques can be used for prolonged anaesthesia and analgesia but it presents management challenges. The study was designed to compare the effects of dexamethasone administered as an adjunct to bupivacaine in supraclavicular brachial plexus block on the onset, duration and postoperative analgesia following upper limb surgeries. **METHODS AND MATERIAL:** A prospective, double-blind study was undertaken in patients scheduled for upper limb surgeries under supraclavicular brachial plexus block. Sixty patients were randomly divided into two groups, Group B and BD. Group B received 30 ml of 0.375% bupivacaine with 2 ml normal saline while Group BD received 30 ml of 0.375% bupivacaine with 2ml(8mg) dexamethasone for supraclavicular brachial plexus block. The groups were compared regarding quality of sensory and motor blockade, duration of post operative analgesia and intra and postoperative complications. **RESULTS:** There was a significant increase in duration of motor and sensory block and analgesia in Group BD as compared to Group B patients ($P < 0.0001$). No significant side effects were noted. **CONCLUSIONS:** The addition of 8 mg of dexamethasone to bupivacaine in supraclavicular brachial plexus block prolongs the duration of motor and sensory block and extends the analgesia period.

KEYWORDS: Anaesthesia adjuvants; Dexamethasone; Brachial plexus block.

INTRODUCTION: Brachial plexus block is a suitable alternative to general anesthesia for elbow, forearm and hand surgery.⁽¹⁾ Local anaesthetics alone does not provide analgesia for more than 4-8 hours. Prolonging the duration of sensory and motor blockade of regional anaesthetic techniques is often desirable to provide intra operative anesthesia and analgesia in the post operative period without any systemic side effects. Several adjuncts have been studied to potentiate efficacy of brachial plexus block including opioids, midazolam, neostigmine, bicarbonate, hyaluronidase and $\alpha 2$ agonists.^(2,3,4) Perineural injection of steroids is reported to influence post operative analgesia. They relieve pain by reducing inflammation and blocking transmission of nociceptive C-fibres and by suppressing ectopic neural discharge. Some studies have demonstrated the analgesic effect of local spinal and systemic corticosteroids in combination with bupivacaine.^(5,6,7) The study was designed to compare the effects of dexamethasone administered as an adjunct to bupivacaine in supraclavicular brachial plexus block on the onset, duration and postoperative analgesia following upper limb surgeries.

MATERIAL AND METHODS: After approval by Institutional Ethical Committee, this study was carried out on 60 American Society of Anesthesiologists (ASA) I/II patients of either sex, in the age group of 20-60 years having fractures of forearm bones for open reduction and internal fixation under supraclavicular brachial plexus block. Exclusion criteria were refusal to regional anesthesia,

ORIGINAL ARTICLE

infection at site, history of allergic reaction to study drugs, systemic use of corticosteroid for 2 weeks or longer, drug abuse, peripheral neuropathy, head injury, respiratory or cardiac diseases, pregnancy, having bleeding disorders, peptic ulcer disease and failure to achieve adequate block within 30 min of administration. Patients were divided into two groups of 30 patients each. Patients were assigned to receive either of the following drugs mixtures: Group B received 30 ml of 0.375% bupivacain with 2 ml normal saline while Group BD received 30 ml of 0.375% bupivacaine with 2ml(8mg) dexamethasone for supraclavicular brachial plexus block.

Randomization was achieved by computer generated random number table. After shifting the patient inside operation theatre, drug solution for infusion was prepared by anesthesiologist not involved in the study according to randomization. The observer who collected the intra-operative data was blinded to the drug solution administered.

All patients were kept nil orally for at least 6 h before the procedure. Premedication was given in the form of tablet alprazolam 0.5mg and tablet ranitidine 150 mg at 10 pm night before surgery. On arrival in the operating room, intravenous line was set using 18 gauge cannula and an infusion of Ringer's lactate was started. The patients were monitored for heart rate (HR), noninvasive measurements of systolic blood pressure(SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP) at an interval of 5 min, continuous electrocardiographic (ECG) monitoring, and hemoglobin oxygen saturation (SPO₂) throughout the perioperative period. After appropriate patient positioning and strict aseptic and antiseptic precautions midclavicular point, external jugular vein and subclavian artery pulsation were identified. About 2cm above the midclavicular point just lateral to subclavian artery pulsation, a 24gauge and 1.5inch long needle was introduced and directed caudal and medially until paraesthesia was encountered, when 32ml of local anaesthetics with or without dexamethasone was injected at the site. A 5min compression at the injection site was performed to facilitate an even drug distribution.

Routine monitoring of all the patients including blood pressure, pulse rate, SpO₂, electrocardiogram was done. We evaluated onset, quality and duration of sensory and motor block along with side effects if any.

For sensory loss assessment, we used pin prick test with a three-point scale-0- Sharp pain felt, 1- Analgesia(dull sensation felt), 2- Anesthesia(no sensation felt).⁽⁸⁾ Motor block was assessed by modified Bromage scale for upper extremities, using a 3 point scale. 0- total movement of fingers and wrist, 1-decreased motor strength with ability to move the fingers only, 2-inability to move fingers.⁽⁹⁾

Block was evaluated every 3 min till complete motor and sensory block after the injection of local anesthetic. Further block assessment was done at hourly intervals up to 24 hr by a blinded anesthesiologist.

Onset of sensory blockade was defined as the interval between the end of injection and loss of sensation to pinprick or by score 1 of pinprick response.

Onset of motor blockade was the interval between the end of injection and complete motor paralysis of wrist and hand.

The duration of sensory blockade being the time interval between sensory blockade and reappearance of pinprick response.

The duration of motor blockade was defined as the time interval between maximum motor blockade and complete movement of wrist and fingers.

ORIGINAL ARTICLE

Duration of analgesia was taken as the time interval between onset of sensory blockade and the first dose of rescue analgesic given to the patient (VRS>4).

Pain assessment in the postoperative period was done using verbal response score, being obtained by asking the patient to rate the intensity of pain perceived by him/her and express it on a numerical scale of 0 to 10, with 0-no pain(One extreme). 10-worst pain possible (other extreme). Rescue analgesia in the form of injection diclofenac 75mg intramuscularly was given to patients with VRS>4. All the patients were monitored intra-operatively and postoperatively in terms of hemodynamic stability and for any side effects.

STATISTICAL ANALYSIS: Categorical variables like ASA status, sex, postoperative analgesic requirement and adverse effects have been compared between groups by using Chi square test. Normally distributed numerical variables were analyzed using unpaired “t” test. Skewed numerical variables within the group were analyzed using Man-Whitney “U” test. All tests were two tailed. Significance was defined as $P < 0.05$.

RESULTS: Total number of patients participated in the study were 34 in group B and 35 in group BD. The number of patients who had partial blocks or failed blocks was 4 in Group B and 5 in Group BD. After excluding these patients, the total number of patients taken for study was 30 in each group. The demographic profiles in both the groups were comparable with respect to age, gender, weight and duration of surgery.[Table 1]

	Group B	Group BD	P Value
Age (Yrs.)	41.27±5.64	40.4±4.74	0.52
Sex(M/F)	18:12	22:08	0.273
Wt. mean	54.13±7.24	52.83±6.8	0.476
Mean Duration of Surgery	80.75±10.49	81.88±11.12	>0.05

Table 1: Demography Profile

The mean time of onset of sensory block in Group B was 13.93±1.66 min and in group Group BD was 12.90±1.49 min($P=0.196$) [Table 2].

	Group B	Group BD	P Value
Onset of sensory block (Min)	13.93±1.66	12.90±1.49	0.196
Onset of moter block (Min)	18.47±2.0	16.76±2.34	0.004
Duration of moter block	202.93±30.55	393.03±98.96	<.001
Duration of sensory block	453.17±72.81	1028.17±194.51	<.001
Time to first rescue analgesic	605.37±58.60	1278.8±82.83	<.001

Table 2: summary of results

The mean duration of sensory block was statistically significant in both the group,it was 453.17±72.18 min in Group B and was 1028.17±194.15min in Group BD ($P=0.001$) [Table 2]. The mean time of onset of motor block in Group B was 18.47±2.0min while mean time of onset of motor block in Group BD was 16.76±2.34 min was also statistically significant ($P= 0.004$) [Table 2]. The mean duration of motor block was longer in BD group (393.03±98.96min) as compared to

ORIGINAL ARTICLE

202.93±30.55 min in Group B.(P<0.001) [Table 2]. The mean time to the demand of first rescue analgesic in the form of injection diclofenac was significantly higher in group BD (1278.8±82.83) as compared to group B(605.37±58.60)[P < 0.001].

Complication in the form of nausea and vomiting was observed in one patient in group B and two patient in group BD which were statistically insignificant. There were no incidences of adverse effects like sedation, hypotension, and pneumothorax in any group [Table 3].

	Group B	Group BD	P Value
Sedation	0	0	-
Nausea	1	2	1
Vomiting	0	0	-
Hypotension	-	0	-
Pneumothorax	0	0	-

Table 3: Side effect in two group

DISCUSSION: Our study demonstrates that the combination of dexamethasone and bupivacaine used for supraclavicular brachial plexus block hastens the onset of motor block and provides a longer duration of sensory and motor blockade and postoperative analgesia as compared to plain bupivacaine(control group).

Movafegh A found that the addition of dexamethasone to lidocaine 1.5% solution in axillary brachial plexus block prolongs the duration of sensory and motor blockade.⁽¹⁰⁾ Prashant et al in their study also found that Addition of dexamethasone to 1.5% lidocaine with adrenaline in supraclavicular brachial plexus block speeds the onset and prolongs the duration of sensory and motor blockade.⁽¹¹⁾

Santosh Kumar et al.demonstrated that the addition of 8 mg of dexamethasone to 0.5% ropivacaine for supraclavicular brachial plexus prolongs sensory and motor block as compared ropivacaine given alone.⁽¹²⁾ Their findings were same as that of our study, but there was no significant difference in the onset of motor block among both groups in their study. This finding of hastening the onset motor block in dexamethasone group may be due to different pharmacodynamic properties of ropivacaine than bupivacaine, which was used in our study.

Shaikh et al. evaluated the use dexamethasone 8 mg as an adjuvant to bupivacaine 0.25%, total volume being 40 ml, in supraclavicular brachial plexus block given for various upper limb surgeries and concluded that addition of 8 mg dexamethasone to bupivacaine 0.25% solution in supraclavicular brachial plexus block prolongs the duration of sensory and motor blockade, reduces the requirement of rescue analgesic in postoperative period but has no effect on the onset time of sensory and motor block.^[13]

Kaabachi et al. reported Using ultrasound-guided single-shot supraclavicular blockade with low-dose dexamethasone in a mixture with levobupivacaine results in prolonged analgesia duration and less analgesic use compared with levobupivacaine alone in patient of upper extremity surgery.^[14]

Parrington et al. observed that that the addition of dexamethasone to mepivacaine for ultrasound-guided supraclavicular brachial plexus block in patients undergoing upper-limb surgery provides a longer duration of postoperative analgesia when compared to brachial block performed with 0.5% levobupivacaine alone.^[15]

ORIGINAL ARTICLE

In our study, only one patient in control group and two patient in study group had nausea and vomiting were managed symptomatically.

We were unable to use ultrasound or nerve stimulator guided blocks due to its unavailability in our institution at the time of our study which could have helped us to lower volume of local anesthetic and less failed block. To conclude 8mg of dexamethasone when added to bupivacaine 0.375% in supraclavicular brachial plexus block prolongs the duration of motor and sensory block and extend the analgesia period.

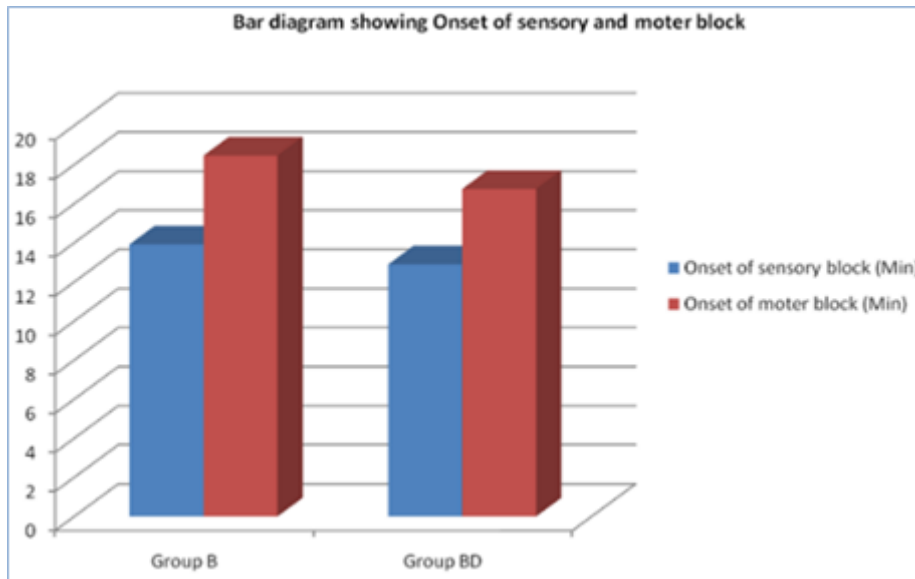


Figure 1

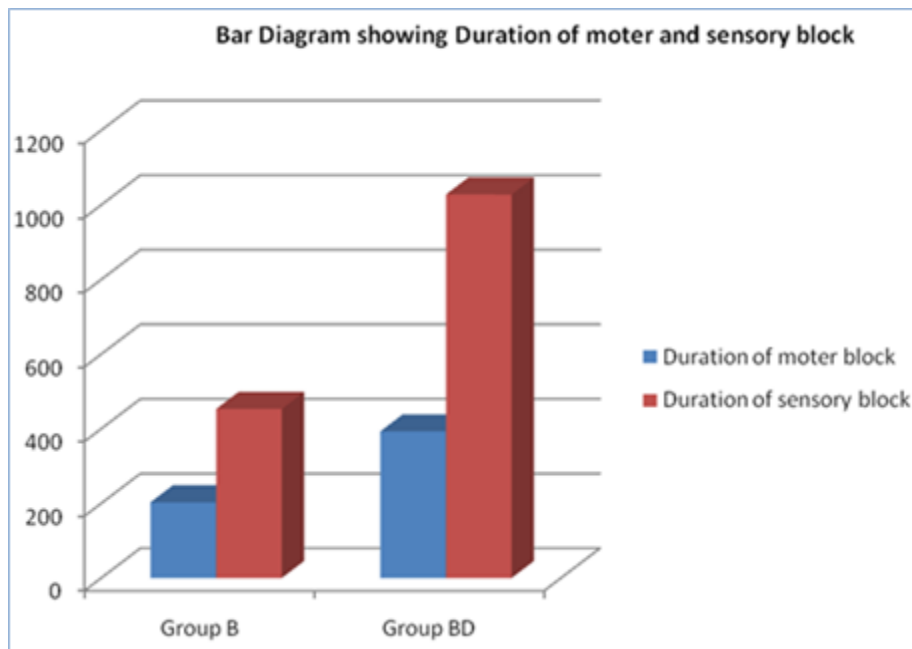


Figure 2

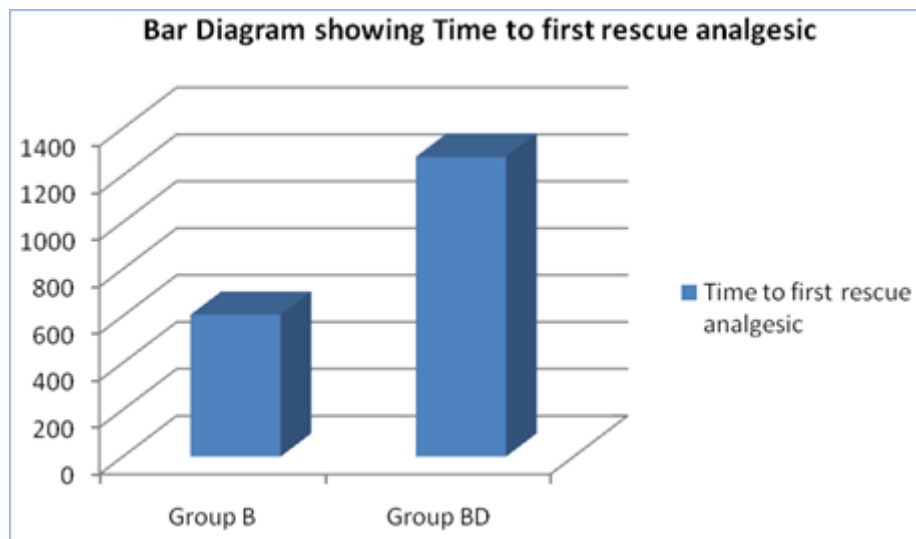


Figure 3

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ORIGINAL ARTICLE

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