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Original Research Article

Efficacy of Bupivacaine with 8 mg Dexamethasone as an adjuvant for Supraclavicular Brachial Plexus Block by comparing with 0.25% Bupivacaine alone

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Abstract: Peripheral nerve blocks came into rise now-a-days because of more advantages on general anesthesia. Steroids are in use as an adjuvant for local anesthetics since many years, as steroids have the effects of anti-inflammatory and analgesia. For Brachial plexus block, Group A and Group B patients were administered with 40 ml of 0.25% of bupivacaine with 2 ml of normal saline and 40 ml of 0.25% Bupivacaine with 8 MG Dexamethasone respectively through Supraclavicular approach. Onset, duration of sensory and motor blockade, duration of postoperative analgesia, postoperative nausea and vomiting effects were observed and assessed. Statistical analysis was done using Graphpad software. There was significantly increase in duration of both sensory and motor block in Group B when compared to Group A. Among Group A and Group B patients duration of postoperative analgesia was 213.4±34.2 minutes and 642.6±21.2 minutes respectively. Duration of Postoperative analgesia is a significant factor which was shown statistically. Postoperative nausea and vomiting was predominant in Group A when compared to Group B. It was about 30% and 6.6% respectively. Dexamethasone as an adjuvant to Bupivacaine offers many advantages than bupivacaine alone. Bupivacaine dexamethasone group increased duration of postoperative analgesia, reduced gastrointestinal side effects and pentazocine requirement as an analgesia when compared to bupivacaine group.
Keywords: Bupivacaine, Dexamethasone, Supraclavicular brachial plexus block.

INTRODUCTION

As rise in population, much migration of people for occupational activities, increase in various industries, automobiles and traffic which totally resulting increase in various injuries to the people. Increase in Trauma cases in turn leads to more number of surgeries. Postoperative pain management is important whatever the type of surgery does, which plays a crucial role in perioperative care.

Peripheral nerve blocks came into rise now-a-days because of more advantages on general anesthesia. Peripheral nerve blocks cause less hemodynamic stability, less respiratory depression, higher safety margin, more simplicity, less side effects than general anesthesia[1]. Peripheral nerve block also produces effective nerve blocks with lesser gastrointestinal side effects when compared to opioid analgesia [2,3]. Supraclavicular block is the convenient and most consistent method for performing upperlimb surgeries below the shoulder joint.

Majority of population were prone to upper limb surgeries, where brachial plexus block is more advantageous for performing bone or soft tissue surgeries. Bupivacaine is oneof the homologous series of mepivacaine, it has been used for all types of nerve blocks, lumbar and caudal epidurals, paracervical blocks[4]. Bupivacaine was selected for this study as other local anesthetics like Lignocaine is restricted for its limited duration of action and Ropivacaine is higher cost and non-availability in our institution. Bupivacaine is available for clinical use as recemic mixture (50:50 mixtures) of enantiomers.

Adjuvants were used in different routes to enhance the duration of postoperative analgesia, but still most of them such as opioid, clonidine, epinephrine results were inconclusive and associated with side effects[5]. Still many adjuvants actions, side effects and its different concentrations for clinical use are in debate.

Steroids are in use as an adjuvant for local anesthetics since many years, as steroids have the effects of anti-inflammatory and analgesia. Addition of

long acting steroids such as methylprednisolone to local anesthetics is used routinely to treat chronic pain syndromes[6].

Dexamethasone is a high potency, long acting glucocorticoid with little mineralocorticoid effect [7]. Glucocorticoids have been used to reduce inflammation and for prevention of postoperative nausea and vomiting. They are also effective in prolongation of postoperative analgesia [8].

The main objectives of this study is to compare the efficacy of bupivacaine alone and bupivacaine with dexamethasone in terms of onset, duration of sensory and motor block and also to assess the duration of postoperative analgesia.

MATERIALS AND METHODS

This is a prospective, randomized comparative study conducted in the Department of Anesthesiology, Government Medical College, Anantapuramu. This two years study was conducted on 60 patients who had upper limb injuries. Before starting the procedure ethical committee approval has taken. Informed consent was taken from the patients.

Patients in the age group of 18-60 years with ASA class 1, 2 & 3 were considered for the study and they were organized in two groups for analyzing the results.

Group A - 30 patients injected with 40 ml of 0.25% Bupivacaine and 2 ml of normal saline.
Group B - 30 patients injected with 40 ml of 0.25% Bupivacaine plus 8mg of dexamethasone.

Patients with ASA class 4&5, hypersensitivity to Bupivacaine or Dexamethasone, infection at the site of injection, presence of coagulopathies, Cardiomyopathies were excluded from the study.

Clearly explained to patients one day before surgery about the benefits and risks related to local anesthetic. All the patients were advised to remain in fasting state and were pre supplemented with Tab Diazepam to relieve their anxiety.

Patient was advised to lay on operation table in supine position by keeping his arm to be operated on hand rest. For Brachial plexus block, Group A and Group B patients were administered with 40ml of 0.25% of bupivacaine with 2 ml of normal saline and 40 ml of 0.25% Bupivacaine with 8 MG Dexamethasone respectively through Supraclavicular approach.

All the resuscitation equipment and the equipment for general anesthesia were kept ready in case of Supraclavicular nerve block complication and block failure. Patients were monitored regularly by noting Blood Pressure, SPo2, Pulse rate. Patients were shifted to I.C.U after surgery, Postopertaive analgesia was assessed with Visual Analogue Scale (VAS) score of 0-10 (0=no pain, 10 = worst imaginable pain). Patients with VAS score >4 were treated with inj. pentazocine 30 mg intravenously. Time for first analgesia supplement requirement wasnoted.

Onset of sensory blockade was measured from the commencement of injection of anesthetic solution until the loss of pinprick sensation. Onset of motor blockade was measured from commencement of injection of anesthetic solution until the loss of finger movements.

Assessment of sensory block was done at each minute after completion of drug injection in the dermatomal areas corresponding to median nerve, radial nerve, ulnar nerve and musculocutaneous nerve till complete sensory blockade by pin prick method.

Sensory block was graded as:

Grade 0: Sharp pin felt.
Grade 1: Analgesia, dull sensation felt.
Grade 2: Anesthesia, no sensation felt.

Assessment of motor block was carried out by the same observer at each minute till complete motor blockade after drug injection. Motor block was determined according to a modified Bromage scale for upper extremities on a 3-point scale:

Grade 0: Normal motor function with full flexion and extension of elbow, wrist and fingers
Grade 1: Decreased motor strength with ability to move the fingers only
Grade 2: Complete motor block with inability to move the fingers

Failure of block was considered if dermatomes supplied by median, radial, ulnar and musculocutaneous nerve did not have analgesia even after 30 min of drug injection. Failure cases treatment was converted to Regional Anesthesia. Monitored for hemodynamic variables such as heart rate, blood pressure and oxygen saturation every 30 min after the block intraoperatively and every 60 min post-operatively. Assessment of blood loss was done and fluid was administered as per the loss. Duration of surgery and various complication were noted.

Statistical Analysis

This was done for comparison of two groups using student's t test and the P value was calculate using Graph pad software. P value <0.05 is considered statistically significant.

RESULTS

A total of 60 Patients presented with trauma and requiring surgery were involved in the study. Most of the cases got trauma due to road traffic accidents about 78.3% and posted for surgery. Amongst 60 patients, 37 were males about 61.6% (Table 1).

Table 1: Demographic data of studied population

S.No.	Characteristics	Group A	Group B
1	Age in years	34.7±6.89	37.6± 3.45
2	Gender (M:F)	19:11	18:12
3	Weight in Kgs	56.2±2.7	55.8±5.32
4	Duration of Surgery in Minutes	55.4±2.33	53.2±1.24

Onset of sensory block and motor block was assessed and noted(Table-2). There is no much change in onset of blockade among Group A and Group B. This variable was statistically insignificant in between these two groups.

Table2: Onset of Sensory and Motor blockade in minutes

Parameter	Time in minutes		t value	P value	Significance
	Group A	Group B			
Loss of pinprick sensation (Mean±SD)	6.24±8.12	6.79±3.2	0.3449	0.7314	NSS
Loss of finger movements (Mean±SD)	7.2±3.3	7.5±5.12	0.2698	0.7883	NSS

SD - Standard Deviation; NSS- Not Statistically Significant

Duration of sensory block and motor block was assessed (Table 3). There was significantly increase in duration of both sensory and motor block in Group B when compared to Group A.

Table 3: Duration of Sensory and Motor blockade in minutes

Parameter	Time in minutes		t value	P value	Significance
	Group A	Group B			
Recovery of pinprick sensation (Mean±SD)	245.3±142.2	689.36±143.5	12.03	<0.0001	SS
Recovery of motor paralysis (Mean±SD)	145.3±158.3	412.1±175.2	6.188	<0.0001	SS

SS: Statistically Significant

Time of onset of analgesia in the postoperative period was assessed. Among Group A and Group B patients duration of postoperative analgesia was 213.4±34.2 minutes and 642.6±21.2 minutes respectively. Duration of Postoperative analgesia is a significant factor which was shown statistically.

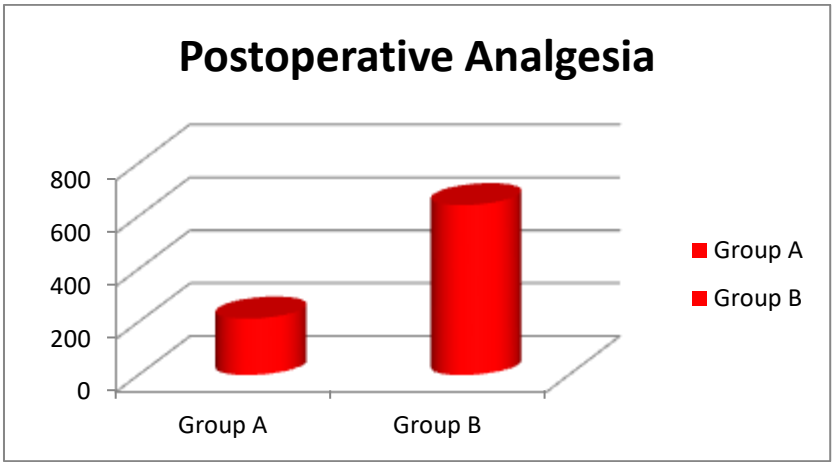

Fig. 1: Showing Duration of Postoperative Analgesia

Injection Pentazocine was received by patients who are VAS >4 and it was assessed at 0, 2, 6 and 12 hours. Analgesia required by about 46.6% patients, those who received only Bupivacaine. Time for requirement of first dose of pentazocine is decreased in bupivacaine dexamethasone group.

Table4: Required time for administration of first dose of Pentazocine among both groups

Time in hours	Group A (n=30)	Percentage	Group B(n=30)	Percentage
0	1	3.33%	0	0
2	5	16.6%	1	3.33%
6	6	20%	2	6.66%
12	2	6.66%	2	6.66%
Total	14	46.6%	5	16.6%

Postoperative nausea and vomiting was predominant in Group A when compared to Group B. It was about 30% and 6.6% respectively.

DISCUSSION

Regional anesthesia is more advantageous than general anesthesia. Regional anesthesia has higher safety profile, ideal alternative technique, not only for patients with cardiomyopathies, Ischemic heart disease, COPD who cannot receive general anesthesia, but can also suggest regional anesthesia to normal patients because of its lesser side effects and convenient method.

Brachial plexus block is becoming more important now-a-days. Many of research works are going on adjuvants which enhance the effects of local anesthetics. Adjuvants increase the duration of postoperative analgesia. Among various adjuvants dexamethasone which is a long acting glucocorticoid decreases the postoperative analgesia and also has anti-inflammatory effects and immunosuppressive effects[9] in peripheral nerve block[10].

Reported by many animal studies that on addition of microspheres of corticosteroids to local anesthetics for peripheral nerve blockade gives analgesic effects[11,12].

In this study amongst 60 patients, 37 were males about 61.6%. Males are more prone to upper limb injuries, as they usually travel for occupation and works in industries and agricultural fields. There is no much change in onset of sensory and motor blockade among Group A and Group B. This variable was statistically insignificant in between these two groups.

As per the present study there was significantly increase in duration of both sensory and motor block in Group B when compared to Group A. Dexamethasone provided a faster onset of action and longer duration of analgesia without any adverse effects[13].

Among Group A and Group B patients duration of postoperative analgesia was 213.4±34.2 minutes and 642.6±21.2 minutes respectively. Duration of Postoperative analgesia is a significant factor which was shown statistically. Shrestha et al[13] and Parrington et al[14] observed that Dexamethasone as an adjuvant to local anesthetic in brachial plexus block enhances the duration of postoperative analgesia when compared to tramadol.

Analgesia required by about 46.6% patients, those who received only Bupivacaine in this study. Postoperative nausea and vomiting was predominant in Group A when compared to Group B. It was about 30% and 6.6% respectively. In line with this study Mohamed et al[15], Aasboe V et al [16] reported that among bupivacaine dexamethasone group reduced postoperative nausea and vomiting. Ammar AS et al [17] also documented that using dexamethasone as an adjuvant to local anesthetics increase duration of analgesia and also reduce both nausea and vomiting.

CONCLUSION

Dexamethasone as an adjuvant to Bupivacaine offers many advantages than bupivacaine alone. Bupivacaine dexamethasone group increases the duration of sensory and motor blockade among patients undergoing upper limb surgeries through supraclavicular brachial plexus block. Dexamethasone also prolongs postoperative analgesia and reduces the requirement of substitution of other analgesics like pentazocine. Time for requirement of first dose of pentazocine is decreased in bupivacaine dexamethasone group when compared to bupivacaine group. Postoperative nausea and vomiting were also significantly lower in Bupivacaine dexamethasone Group.

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