Efficacy of Dexamethasone as an Adjuvant with Lignocaine-Adrenaline and Bupivacaine for Supraclavicular Brachial Plexus Block Versus Lignocaine-Adrenaline with Bupivacaine only

Ajeet Jyotipurkar[1], Ranjeeta Aske[2]

ABSTRACT

Introduction: Many adjuvants with local anesthetic have been used for brachial plexus block prolongation. Dexamethasone when added to local anesthetic, block prolongation with analgesic and anti inflammatory effects have been seen.

Material and Methods: 50 randomly selected patients undergoing upper limb surgeries, 20-50 years, ASA grade 1 and 2 grouped in A and B 25 each. And injected with 15 ml of lignocaine-adrenaline + 15 ml of 0.5% Bupivacaine (P) and 2 ml of normal saline in Group A and 2ml of dexamethasone(8mg) instead of saline in Group B. Observation and assessment of onset, duration of sensory and motor blockade, postoperative analgesia duration, nausea and vomiting were done. Graphpad software was used for statistical analysis.

Results: There was significantly increase in duration of both sensory and motor block in Group B when compared to Group A. Among Duration of postoperative analgesia in Group A and B was 213.4±34.2 minutes and 642.6±21.2 minutes respectively. Postoperative nausea and vomiting was comparatively more in Group A (30%) compared to Group B (6.6%) respectively.

Conclusions: Dexamethasone increases the duration of sensory and motor blockade, prolongs postoperative analgesia and reduces the requirement of other analgesics and incidence of gastrointestinal side effects when added to local anaesthetics in supraclavicular brachial plexus block.

Keywords: Dexamethasone, Effects, Lignocaine Adrenaline, Bupivacaine, Supraclavicular Brachial Plexus Block

INTRODUCTION

Increase in occupational activities has increased various injuries to the people.Increased trauma leads to increased surgeries and therefore perioperative pain management has got a crucial role.

Now-a-days peripheral nerve blocks has become more advantageous than general anaesthesia due to less hemodynamic and respiratory complications, simpler technique, less side effects, postoperative analgesia and early discharge from hospital. For upper limb surgeries below the shoulder joint under regional anaesthesia, brachial plexus block is a safe and convenient method. And the supraclavicular approach has been practiced routinely for upper limb surgeries in our institution.

Bupivacaine is long acting local anaesthetic homologous to mepivacaine, it has been used for all types of nerve blocks[1]. Bupivacaine and lignocaine with adrenaline were selected for this study as other local anesthetics due to there longer duration of action.

Different adjuvants were used with local anesthetic to enhance the duration of postoperative analgesia and most of them have met with limited success.

Steroids have been used since many years as an adjuvant for local anesthetics, due to both anti-inflammatory and analgesic effects.

Dexamethasone a long acting, high potency glucocorticoid with minimum mineralocorticoid effect[3], Anti-infammatory effect with minimum gastrointestinal side effects, also prolongs duration of postoperative analgesia[4].

Recent studies shown that 8 mg dexamethasone when added to local anesthetic injections prolongs the duration of peripheral nerve block analgesia[5]. A previous study evaluated the effect of dexamethasone added to a mixture of ligocaine with adrenaline and bupivacaine in supraclavicular brachial block[2].

The aim of our study was to compare the effect with or without addition of dexamethasone 8 mg to lignocaine (2%) with adrenaline (1:2,00,000) and 0.5% bupivacaine (plain) for onset, duration of sensory and motor block and also to assess the duration of postoperative analgesia in supraclavicular brachial plexus block in patients undergoing surgeries below shoulder joint.

MATERIAL AND METHODS

After taking approval from ethical committee and written Informed consent from patients, a Prospective, Randomized Comparative study conducted in the Department of Anaesthesiology, Gandhi Medical College, Bhopal.

50 randomly selected patients undergoing upper limb surgeries, 20-50 years, ASA grade 1 and 2 grouped in A and B 25 each.

ASA grade 3 and 4 patients with contraindications for regional anaesthesia (refusal, infection at site, coagulopathy, neuro or cardiac defects),allergy to local anaesthetic drugs,

[1]PG Student, 3rd Year RMO, [2]Assistant Proffesor, Department of Anaesthesiology, Gandhi Medical College and Hamidia Hospital, Bhopal, India

Corresponding author: Dr. Ajeet Jyotipurkar, E Block 6, PG Resident Boys Hostel, Gandhi Medical College and Hamidia Hospital, Bhopal, India

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patients on antihypertensive and antidepressents etc are excluded from this study.

Group A: 15 ml of lignocaine-adrenaline + 15 ml of 0.5% Bupivacaine (P) and 2 ml of normal saline, injected to 25 patients.

Group B: 15 ml of lignocaine-adrenaline + 15 ml of 0.5% Bupivacaine (P) with 2ml of dexamethasone (8mg), injected to 25 patients.

Benefits and risks of local anesthetic were explained clearly to patients one day prior to surgery and advised to remain nil by mouth.

Patient was advised to lay on operation table in supine position and a brachial block was performed through supraclavicular approach under all aseptic precautions.

Technique: The patient lying supine, head rotated to opposite side, arms and shoulder adducted to the body. A local wheal is raised 1cm above the midpoint of clavicle just lateral to the pulsating subclavian artery or lateral to the outer border of scaleneus anterior.

Direction of needle – downwards, inwards and backwards

All the resuscitation equipment for general anaesthesia were kept ready in case of Supraclavicular nerve block complication and failure. Failure cases were excluded from the study.

Regular monitoring of patient for Blood Pressure, SpO2, ECG, Pulse rate, Respiratory rate was done and noted.

Visual Analogue Scale (VAS) score, used for assessing postopertaive analgesia. Score 0-10 (0=no pain, 10 = worst pain).Patients with VAS score >4 were treated with intravenous analgesic. And time for first analgesic supplement requirement was noted.

Onset of sensory block was noted from the commencement of injection of drug until the loss of pinprick sensation. And onset of motor block was noted from commencement of injection of drug until the loss of finger movements.

Assessment of onset of sensory blockade was done at each minute after completion of drug in dermatomal areas till complete sensory blockade by the pin prick method.

Sensory block graded as:

Grade 0: Sharp pain

Grade 1: Analgesia, dull sensation

Grade 2: Anesthesia, no sensation

Onset of Motor block assessment was done at each minute till the complete motor blockade after drug injection. And modified Bromage scale used to determine motor blockade 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 fingers

Block failure was considered when the dermatomes supplied did not have analgesic effect even after 15 min of drug injection.

Heart rate, blood pressure, ECG and oxygen saturation monitored every 5 min after the block intraoperatively and every 15 min post-operatively,Blood loss was assessed and fluid was administered as per the loss. Duration of surgery and any complication were noted.

STATISTICAL ANALYSIS

Student's t-test was used to compare two groups here.

Graph pad software was used to calculate P value.

P value <0.05 is considered statistically significant (SS).

RESULTS

A total of 50 Patients presented with upper limb injury requiring surgery for the same were involved in this study. The demographic data and surgical characteristics were comparable in both groups [Table 1].

Onset of sensory and motor blockade were comparable in both the groups (Table-2). There is no much change in onset of blockade among both the groups hence statistically insignificant.

Duration of sensory and motor blockade were comparable in both the groups (Table 3). There was significant increase in duration of both sensory and motor blockade in Group B when compared to Group A.

Time of requirement of 1st rescue analgesic in the postoperative period was assessed and noted.Injection of analgesic was received by patients who are VAS >4 and it was assessed at 0, 2, 6 and 12 hours.Analgesia required by about 48% patients in Group A, And was significantly decreased when compared in Group B (16%).

Duration of postoperative analgesia is a statistically significant factor (Figure 1) and was more in group B(644.8±10 minutes) when compared to Group A(225.4±18.78 minutes)

Incidence of postoperative nausea and vomiting was more in Group A (30%) when compared to Group B(6%).

S. No.	Characteristics	Group A	Group B
1	Age (years)	30.7±6.89	32.6± 3.45
2	Sex (M:F)	16:9	15:10
3	Weight (Kgs)	55.2±2.7	55.8±5.3
4	Duration of Surgery (Minutes)	55.4±3.33	53.9±2.24

Table-1: Demographic data of population under study

Parameters	Time in minutes		T value	P value	Significance
	Group A	Group B			
Onset of sensory blockade (Mean±SD)	6.30 ± 7.02	6.84 ± 4.4	0.3259	0.7459	NSS
Onset of motor blockade (Mean±SD)	7.4 ± 3.0	7.7 ± 5.1	0.2535	0.8010	NSS
SD - Standard Deviation; NSS- Not Statistically Significant					

Table-2: Onset of Sensory and Motor blockade in minutes

Parameters	Time in minutes		T value	P value	Significance
	Group A	Group B			
Onset of sensory blockade (Mean±SD)	260.4 ±152.2	698.6 ±154.6	10.09	<0.0001	SS
Onset of motor blockade (Mean±SD)	155.3 ±166.2	430 ± 186.2	5.503	<0.0001	SS
SD - Standard Deviation; SS: Statistically Significant					

Table-3: Duration of Sensory and Motor blockade in minutes

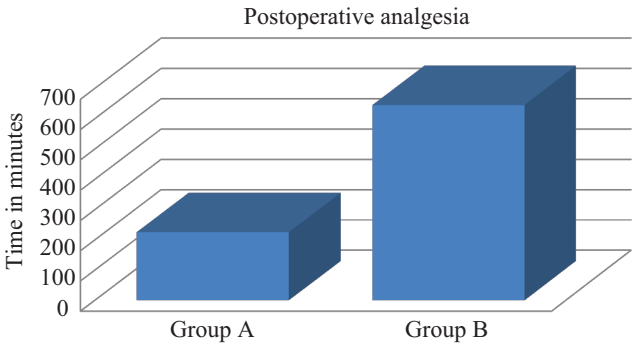

Figure-1: Duration of Postoperative Analgesia

DISCUSSION

Regional anesthesia when compared to general anaesthesia is more advantageous as it has higher safety profile, ideal alternative technique, not only for patients with comorbidities like 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, simpler and convenient method.

Since many years a lot of research works are going on adjuvants which enhance the effects of local anesthetics. Among various adjuvants used to prolong the duration of postoperative analgesia, dexamethasone which is a long acting glucocorticoid decreases the postoperative analgesia and also has an antiinflammatory effects[6,7]. Reported by many animal studies that on addition of microspheres of corticosteroids to local anesthetics for peripheral nerve blockade gives analgesic effects[8,9].

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.But 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 side effects[10]. Duration of Postoperative analgesia is a significant factor which was shown statistically.

Pathak RG et al[11] noted that the addition of dexamethasone to local anaesthetic drugs in brachial plexus block significantly prolongs the duration of analgesia and motor block in patients undergoing upper limb surgeries and found dexamethasone as safe and cost effective method of providing post operative analgesia. Shrestha et al[12] and Parrington et al[13] observed that Dexamethasone as an adjuvant to local anesthetic in brachial plexus block enhances the duration of postoperative analgesia when compared to tramadol. Ammar AS et al[5] also documented that using dexamethasone as an adjuvant to local anesthetics increase duration of analgesia and also reduce both nausea and vomiting.

CONCLUSION

Dexamethasone when used as an adjuvant to lignocaine adrenaline and bupivacaine offers many advantages than lignocaine adrenaline and bupivacaine alone.

Group with Dexamethasone 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 other analgesics.

Time for requirement of first dose of analgesic is decreased in dexamethasone group when compared.

Postoperative nausea and vomiting were also significantly lower in dexamethasone Group.

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