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THE EFFECT OF ADDITION OF DEXAMETHASONE 8MG TO LOCAL ANESTHETICS IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK IN UPPER LIMB SURGERIES – A RANDOMISED DOUBLE BLINDED CONTROL STUDY

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ABSTRACT

INTRODUCTION: Brachial plexus block was performed using supraclavicular approach and a mixture of adrenalized lignocaine either alone or combined with dexamethasone was administered. Dexamethasone is selected as an adjuvant to local anaesthetics in brachial plexus block because it has been reported to prolong duration of action of local anaesthetics. This randomised double blind control study was done to assess the effect of addition of dexamethasone to adrenalised lignocaine. **MATERIALS AND METHODS***:* 60 patients with ASA grade 1 and 2, in age group 20 to 50 years, are grouped into two. Group 1 (cases) – received 1.5% adrenalized xylocaine and dexamethasone 8mg.Group 2 (control) - received 1.5% adrenalized xylocaine and 0.9% normal saline. **RESULTS***:* The mean onset of sensory block in grp 1 in mins 12.73+/- 2.877.The mean onset of sensory block in grp 2 in mins 11.54 +/- 2.958. The mean onset of motor block in grp 1 in mins 16.28 +/- 5.605. The mean onset of motor block in grp 2 in mins 15.69+/- 5.115. The mean duration of analgesia in grp 1 in mins 342.28 +/- 38.73.The mean duration of analgesia in grp 2 in mins 178.70 +/- 27.69. The mean duration of motor block in grp 1 in mins 258.87 +/- 25.65. The mean duration of motor block in grp 2 in mins 130.39 +/-15.23. **CONCLUSION***:* 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 is remarkably safe and cost effective method of providing post operative analgesia.

Keywords: Supraclavicular brachial plexus block, Dexamethasone, Xylocaine

1.INTRODUCTION

Regional anesthesia is an excellent adjunct or alternative to general anesthesia for extremity surgery. It provides superior postoperative analgesia and hastens recovery from anesthesia. Although regional anesthesia has an opioid-sparing effect, occasionally postoperative analgesic duration is not adequate to compensate for the acute nociception associated with surgery in the early perioperative phase of healing. Many adjuvants including clonidine, neostigmine, epinephrine, tramadol, buprenorphine, and dexamethasone have been added to local anesthetics (LA) in an effort to enhance postoperative analgesia. There remains controversy regarding the relative efficacy of these respective additives in that it remains unknown whether or not their effectiveness is due to a local, perineural, or a systemic effect from the absorbed agent. Various steroids has been used for this purpose, but dexamethasone, a derivative synthetic glucocorticoid is preferred because of its highly potent anti-inflammatory property, about 25-30 times as potent as hydrocortisone and without any mineralocorticoid activity. Thus was found to be safer and devoid of potential side effects. 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. So the present study is being undertaken in a randomised double blinded manner to evaluate the onset time, duration and analgesic efficacy of dexamethasone-xyloadrenaline(1.5%) combination compared to plain xyloadrenaline(1.5%) for brachial plexus block by supraclavicular approach.

2.MATERIALS AND METHODS:

After obtaining approval from hospital academic and ethics committee and written, informed valid consent, 60 patients of either sex, ASA grade 1 and 2 in the age range of 20-50

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years who were posted for upper extremity surgeries below the shoulder joint, received brachial plexus block by supraclavicular approah. Patients with any bleeding disorder or on anticoagulants, severe respiratory disease, neuro deficit involving brachial plexus, local infection at the injection site, history of allergy to local anaesthetic , patients with a history of peptic ulcer disease, diabetes mellitus, hepatic or renal failure (contraindication to steroids) and pregnant women were excluded from the study. The study was a randomised, prospective, double blinded and controlled study. Patients were randomly allocated to one of the two groups using a standard randomisation code.

Group I (cases): Patients in this group received 1.5% adrenalised lignocaine(28 ml) plus dexamethasone 8mg(2ml) making a total volume of 30ml.

Group I,I (control): Patients in this group received 1.5% adrenalized lignocaine (28ml) plus 0.9% normal saline (2ml) making a total volume of 30ml.

Once a patient was brought in to the operation theatre standard monitoring was set up, including noninvasive arterial blood pressure, heart rate, and pulse oximetry. An 18-gauge IV cannula was inserted in the forearm and an infusion started with lactated Ringer's solution. Midazolam 0.05 mg/kg IV bolus was used for sedation after the block was achieved, so as to allay apprehension and anxiety during the operative procedure. Hemodynamic variables were measured 10 min before block placement and every 3 min thereafter till the end of surgery. Nerve blocks were performed,by eliciting paresthesia using a 22G short-beveled, needle. Negative aspiration was performed while injecting the drug solution to avoid any intravascular placement. Sensory and motor blocks on the operated limb were evaluated at 0, 5, 15, 30,60,2hrs,6hrs,12hrs,24hrs after the completion of anaesthetic injection by one of the authors who were unaware of the drug combination administered. Sensory block was assessed by pinprick discrimination (with 22G hypodermic needle) and motor block was evaluated by asking the patient to move the forearm against resistance and to flex the forearm. Brachial plexus block was considered successful by Vester-

Andersen's criteria when at least two out of four nerve territories (radial, ulnar, median, and musculocutaneous) were effectively blocked. Onset of sensory block was defined as a reduction of sensibility to 30% or less while onset of motor block was defined as reduction of muscle power to grade 3 or less. The time to surgical blockade was defined as the time from the end of anesthetic injection to loss of pinprick sensation along the distribution of the ulnar and radial nerves along with inability to circumrotate the thumb of the concerned limb. When surgical anesthesia was not achieved in a patient even after 30 min from the anesthetic injection, the case was considered as failed block and the operation was then performed under general anesthesia. Following operation, all patients were observed in postanesthesia care unit and received rescue analgesic as soon as they complained of any pain. This consisted of tramadol 100 mg IV, repeated if necessary. Patients were given clear instruction to ask for a rescue analgesic as soon as they sensed discomfort caused by pain on the operated hand. The time from the end of anesthetic injection in the operated hand till the first request for postoperative rescue analgesic was recorded in each patient.

Assessments:

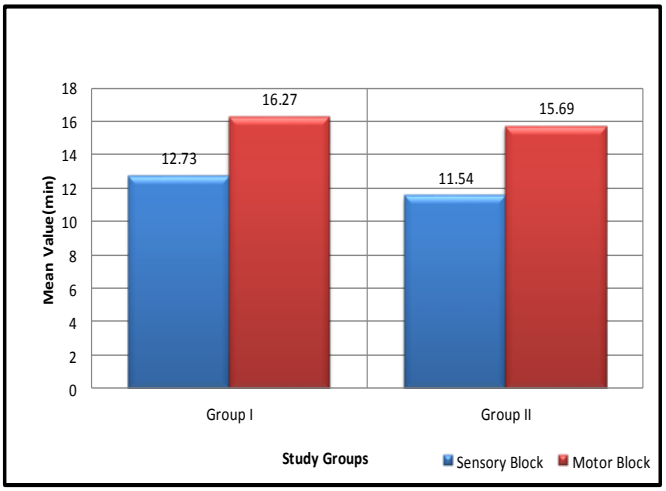
The primary outcome measure was duration of analgesia. This was estimated as the time interval from placement of the block till first injection of rescue analgesic. Secondary outcome measures were onset and duration of sensory and motor blockade and any suspected adverse drug reactions. Noninvasive arterial blood pressure, heart rate and hemoglobin oxygen saturation monitoring was done throughout the procedure.

3.RESULTS:

60 patients of either sex, ASA grade 1 and 2 in the age range of 20-50 years who were posted for upper extremity surgeries below the shoulder joint, received brachial plexus block by supraclavicular approah. The results were tabulated. **Table 1: Patients Characteristics**

Groups	GroupI		GroupII		P value
Age	36.23±6.14		37.4±5.23		>0.05
Duration of surgery(min)	80±37.14		94.2±28.89		> 0.05
Weight(kg)	67.39±9.725		61.77±4.76		>0.05
Height(cm)	165.3±4.668		160.6±4.620		>0.05
Sex distribution	Male	Female	Male	Female	>0.05
	17	13	19	11	

Chart 1: Onset of block between two groups



The onset of sensory and motor blockade between two groups were foiund to be similar and comparable statistically.

Table 2: Duration of Sensory Block

Study Groups	Mean (min)	P value	Significance
Group I	**342.28±38.73**	**<0.0001**	**Highly significant**
Group II	**178.70±27.69**		

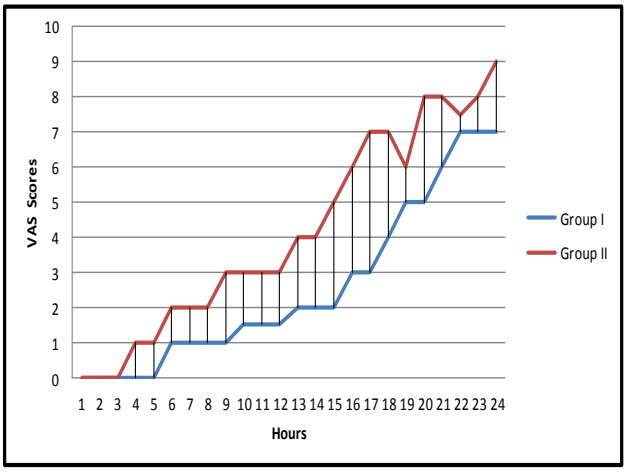
The duration of sensory blockade in the study group seem to be prolonged and was proved statistically.

Table 3: Duration of Motor Block

Study Groups	Mean(min)	P value	Significance
Group I	**258.87±25.65**	**<0.0001**	**Highly significant**
Group II	**130.39±15.23**		

The duration of motor block was statistically higher in the study group compared to that of control group.

Chart 2: Comparison of VAS Scores



The VAS scores between the two groups were compared in the above table.

4.DISCUSSION:

In our study, the demographic variables such as age, sex, duration of surgery, weight and height were compared and proved to be statistically insignificant. The mean onset of sensory block in minutes was 12.73 ± 2.827 and 11.54 ± 2.958 in group II (p = 0.4101). The mean onset of motor block in minutes in group I and group II was 15.8 ± 5.605 and 16.6 ± 5.115 respectively (p = 0.6005).(Chart 1)
Both these data were not significant statistically as p > 0.05. So our study showed that there was no significant difference in the onset time of sensory and motor block between two groups. In one study by Shrestha BR, Maharjan SK, Tabedar S onset of action was 10-30 minutes in local anesthetic group (mean 18.15 ± 4.25) and 10-20 minutes (mean 14.5 ± 2.10) in the local anesthetic plus steroid group. They found statistically significant difference between two groups. Our study correlates with the studies of Movafegh A et al. and Parrington SJ et al. which defines that the onset time of sensory block (18.26 ± 1.25 min in dexamethasone group versus 18.70 ± 1.26 min in control group) was similar in the two groups (p value = 0.201). The onset time of motor block (19.96 ± 1.28 min in dexamethasone group versus 20.26 ± 1.28 min in control group) was also similar in the two groups (p value = 0.402).

In our study, the mean duration of analgesia in group I was 342.28± 38.73 minutes whereas in group II it was 178.70 ± 27.69 minutes (p < 0.0001).(Table 2) And the mean duration of motor block in group I and group II were 258.87 ± 25.65 and 130.39 ± 15.23 minutes respectively (p < 0.0001).(Table 3) Both these data's were highly significant statistically which showed that both the duration of analgesia and motor block were significantly prolonged compared to the control group. Several studies have shown that addition 4-8 mg of dexamethasone to local anesthetics effectively and significantly prolongs the duration of analgesia. Ali Movafegh, Mehran Razazian, Fatemeh Hajimaohamadi, and Alipasha Meysamie did a prospective, randomized, double-blind study to evaluate the effect of dexamethasone added to lidocaine on the onset and duration of axillary brachial plexus block. Sixty patients scheduled for elective hand and forearm surgery under axillary brachial plexus block were randomly allocated to receive either 34 mL lidocaine 1.5% with 2 mL of isotonic saline chloride (control group, *n* = 30) or 34 mL lidocaine 1.5% with 2 mL of dexamethasone (8 mg) (dexamethasone group, *n* = 30). Neither epinephrine nor bicarbonate was added to the treatment mixture. They used a nerve stimulator in all of the patients. They found that the duration of surgery and the onset times of sensory and motor block were similar in the two groups. The duration of sensory (242 ± 76 versus 98 ± 33 min) and motor (310 ± 81 versus 130 ± 31 min) blockade were significantly longer in the dexamethasone than in the control group ($P < 0.01$).

The safety of dexamethasone use in a nerve sheath may raise some concerns. In animal experiments, repeated intrathecal injections of small-dose betamethasone25 and triamecilonon acetate26 did not induce spinal neurotoxicity. In one study, after approximately 2000 intrathecal injections of dexamethasone (8 mg) in 200 patients for treatment of posttraumatic visual disturbance, no neurological disorders were found at 1-month follow up. Nerve injury is a rare complication of dexamethasone injection, and it usually occurs in the context of needle trauma. The dose of dexamethasone as an adjuvant to local anaesthetics for peripheral nerve block has not been described; we used a dose of 8 mg because administration of this dose seems to be safe in adults. Adverse effects with a single dose of dexamethasone are probably extremely rare and minor in nature,and previous studies have demonstrated that short-term (< 24 hours) use of dexamethasone was safe.

Offering the pain free period to the patient during postoperative time is essential on humanitarian grounds. Besides it eliminates the stress response to surgery and helps in smoother transition of the patient from surgery to the routine preoperative state.Thus, our study has shown that addition of dexamethasone to a mixture of local anesthetics in the brachial plexus block, using supraclavicular approach, produced prolonged motor blockade and effective postoperative analgesia which lasted longer than that produced by local anaesthetics alone without any significant side effects. Also it is a very cost effective way of providing analgesia as the cost of one ampoule of dexamethasone is Rs 3.32 only and the patient does not require other analgesic drug in immediate postoperative period. Several studies have come up with the addition of bupivacaine along with xyloadrenaline to prolong the duration of analgesia and motor block.

5.CONCLUSION:

Mean onset of sensory block in grp 1 in mins 12.73+/-2.877. Mean onset of sensory block in grp 2 in mins 11.54 +/- 2.958. Mean onset of motor block in grp 1 in mins 16.28 +/-

5.605. Mean onset of motor block in grp 2 in mins 15.69+/- 5.115.Mean duration of analgesia in grp 1 in mins 342.28 +/- 38.73. Mean duration of analgesia in grp 2 in mins 178.70 +/- 27.69. Mean duration of motor block in grp 1 in mins 258.87 +/- 25.65. Mean duration of motor block in grp 2 in mins 130.39 +/-15.23.

In conclusion, 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 is remarkably safe and cost effective method of providing post operative analgesia.

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