



COMPARISON OF EFFECT OF DEXAMETHASONE IN BRACHIAL PLEXUS BLOCK

Medical Science

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ABSTRACT

Background: In order to prolong the duration of brachial plexus block, various adjuvants are used. Dexamethasone has been found to increase the duration of block. This prospective randomised double blind study was conducted to evaluate the effect of dexamethasone addition on the onset and duration of brachial plexus block. **Method:** After taking ethical committee approval from the institution, 80 ASA grade 1 and grade 2 patients undergoing elective forearm surgery were recruited for the study. These patients were divided into lignocaine group and lignocaine with dexamethasone group who received 5 mg per kg lignocaine with adrenaline and 2ml normal saline and 5 mg per kg lignocaine with adrenaline with 2 ml of dexamethasone respectively. Brachial block was performed using nerve stimulation technique, onset and duration of sensory and motor block and post operative analgesia were recorded. Patient vital parameters (pulse rate, blood pressure and oxygen saturation) were recorded at 5, 10, 20, 30 and there after every 10 minutes interval till the end of the surgery. **Results:** Onset of sensory and motor blockade was found to be quick in the dexamethasone group as compared to control group. The duration of sensory and motor blockade was significantly more in dexamethasone group as compared to control group. **Conclusion:** When dexamethasone is added to brachial plexus block, the onset of block and duration is increased thereby providing postoperative analgesia for a longer duration.

KEYWORDS

Adrenaline, brachial plexus block, dexamethasone, lignocaine, supraclavicular block

Introduction

It is desirable to have a long duration of sensory and motor blockade in regional anaesthesia technique thereby providing adequate anaesthesia for longer surgery duration and adequate pain relief in post operative period.

Various agents are added to the local anesthetics solution while giving brachial plexus block to increase the duration of anaesthesia. Dexamethasone when added to bupivacaine in well known to prolong peripheral nerve block, local analgesia on subcutaneous injection and intercostal nerve block (1-5). In axillary nerve block open long duration of analgesia was seen with dexamethasone addition. (6). Dexamethasone when added bupivacaine has shown increased analgesia but doubt exist whether the increased duration is due to bupivacaine or dexamethasone (7). So we plan to conduct study using lignocaine which has a shorter duration of action so that effect of dexamethasone on duration of anesthesia can be assessed.

Material and Method

After taking ethical committee approval from the hospital ethical committee and written informed consent from the patient, 50 ASA grade 1 & 2 patients from the age group 20 to 70 years undergoing elective surgery of forearm and arm were included. Patients with chronic diseases like diabetes mellitus, hypertension, peripheral neuropathy and other hepatic and renal diseases were excluded from the study. Pregnant patients and patients with known allergy to local anaesthetic drug were also excluded. Patients were randomly allocated into two groups using a computer generated table. Group A received 5 mg per kg 2% lignocaine with adrenaline and 2 ml of normal saline where is group B received 5 mg per kg 2% lignocaine with adrenaline and 8mg dexamethasone in brachial block.

After premedication patient was taken into OT and monitor (ECG Pulse oximeter and non invasive blood pressure monitor) was attached. An 18 G intravenous cannula was secured on the opposite arm. Supraclavicular brachial plexus block was performed on the site of surgery precautions using paraesthesia technique. Sensory and motor blockade of all the nerves of ARM and forearm that is radial medial and musculocutaneous and ulna were recorded at 5, 10, 20 and 120 minutes and every 30 minutes till the end of the surgery. sensory block was assessed using visual analogue scale pair 10 was normal sensation and zero is no sensation. Movement of muscles supplied by the nerve was evaluated for radial nerve, ulnar median nerve and musculocutaneous nerve using thumb abduction, adduction pronation of forearm and flexion of elbow in supination. Power of the muscle was quantified according to Modified Lovett rating scale.

The block was considered successful on complete absence of sensory and motor response and the time was noted as onset of onset. Time of return of post operative pain and recovery of muscle function was noted as duration of block.

The study was double blinded where neither the patient nor the doctor giving the block knew about the drug mixture used.

Patients vital parameters (pulse rate, blood pressure and oxygen saturation) were recorded preoperatively and at regular intervals till the end of the surgery. Rescue analgesia of inj. Diclofenac 75 mg intra muscular was given to patients. Patients with failed block were excluded from the study.

Results

The demographics data was comparable in both the groups. The onset of sensory and motor blockade in dexamethasone group was 13.4 ± 2.8 min and 16.0 ± 2.7 respectively. The onset of sensory and motor blockade in control group was 16 ± 2.3 min and 18.7 ± 2.8 min, respectively. The duration of sensory and motor blockade in the dexamethasone group was 326.0 ± 58.6 and 290.6 ± 52.7 respectively. The duration of sensory and motor blockade in control group was 159.0 ± 20.1 min and 135.5 ± 20.3 min respectively. The sensory and motor blockade was significant in dexamethasone group as compared to control group. No side-effect or complication was seen in the patients of both the groups.

Discussion

In our study, the onset of sensory and motor blockade was significantly quick and the duration of blockade was longer in dexamethasone group.

There are some studies which suggest dexamethasone prolonged duration of sensory and motor blockade in brachial block but there was no difference in onset of sensory and motor blockade however our study has shown early onset and a longer duration of action (6, 8).

Other studies that have been conducted on adding dexamethasone to local anesthetics solution have demonstrated longer duration of sensory and motor blockade in peripheral nerve block, subcutaneous injection, intercostal nerve block and intravenous regional anaesthesia (1,2,3,4,5,9). Studies conducted on prednisolone has also shown to have similar findings (10).

The mechanism of action of dexamethasone in enhancing the onset and duration of sensory and motor blockade is not well understood. Dexamethasone when incorporated alone does not exhibit any

analgesic property (2). This property has been attributed to its anti inflammatory property. The anti inflammatory properties of glucocorticoid and their degree of blockade prolongation go hand in hand and it can be reversed by using specific glucocorticoid receptor antagonist thereby approving the hypothesis that these effects are mediated by classical glucocorticoid receptor and the action is locally (1,2). They act by altering the function of ion channel and producing local acidosis in never cells. This reduce the amount of local anaesthetic solution required to produce conduction block or tapping the bupivacaine molecule in never cells. Both these mechanisms increase the duration of analgesics (1,5). Nitric oxide synthase which mediated local anaesthetic tachyphylaxis is also inhibited by dexamethasone (11).

Another mechanism of action of glucocorticoid, inhibition of phospholipase A2 which is useful in backache and facet syndrome is not involved in peripheral nerve block. Conduction of nociceptive C fibres is reduced by corticosteroids in animal model and the effect is instantaneous and persist till the application of steroids (12).

Benzyl alcohol present in methyl prednisolone commercial preparations can contribute to brachial plexus nerve block (4,13). Alcohol is toxic to nerve and is used in neurolysis nerve blocks. There was no benzyl audiobook is our dexamethasone preparation.

Conclusion

Addition of dexamethasone to lignocaine with adrenaline has shown to improve the onset and duration of sensory and motor blockade in brachial plexus nerve block.

Table 1. Demographic data

	Dexamethasone group	Control group
Age(years)	50±12	48±15
Weight(kg)	55±7	58±6
Sex(F/M)	10/40	15/35
Duration of surgery(minutes)	90±15	85±13

Table 2. Sensory and motor blockade of brachial plexus block.

Sensory block	5 min	10 min	20 min	120 min	150 min	180 min	5 min	10 min	20 min	120 min	150 min	180 min
Musculo cutaneous	6.5±1.2	3.5±1.0	1.0±0	2.8±2.4	6.3±3.0	9.7±0.3	6.4±1.3	2.6±1.1	1±0	0±0	0±0	0.3±0.1
Radial	6.4±1.5	3.4±1.2	1.0±0	2.9±3.0	6.0±3.1	9.5±0.4	6.5±1.3	2.5±1.1	1±0	0±0	0±0	0.2±0.1
Median	6.4±1.3	3.1±1.2	0±0	2.8±2.5	5.9±3.0	9.0±0.6	6.4±1.1	2.0±1.1	1.2±0.5	0±0	0±0	0.2±0.1
Ulnar	6.7±1.2	3.7±1.4	0±0	2.9±3.2	6.3±3.2	9.7±0.2	6.6±1.4	2.2±1.0	1±0	0±0	0±0	0.1±0.1
Motor block												
Musculo cutaneous	5±0.5	3±0.5	0±0	3.3±2	5.6±1	6±0	4.5±0.5	2.2±1	0±0	0±0	0.3±0.5	0.4±0.9
Radial	5±0.5	2.8±0.5	0±0	3.4±2	5.5±1	6±0	4.5±0.5	2.2±1	0±0	0±0	0.3±0.6	0.5±1
Median	5±0.4	2.5±0.5	0±0	3.3±2	5.5±1	6±0	4.5±0.6	2.2±0.9	0±0	0±0	0.3±0.5	0.5±1
Ulnar	5±0.5	2.7±0.5	0±0	4±2	5±1	6±0	4.5±0.5	2.3±1.1	0±0	0±0	0.3±0.5	0.5±0.9

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