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COMPARATIVE EVALUATION OF 0.5% BUPIVACAINE AND 0.5% BUPIVACAINE WITH DEXAMETHASONE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR ELECTIVE UPPERLIMB SURGERIES

Anaesthesiology

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ABSTRACT

Aims and objectives: To observe the effect of dexamethasone on onset and duration of anaesthesia, when used as an adjuvant to bupivacaine in supraclavicular brachial plexus block. Aim of the study is to evaluate the effects of 0.5% Bupivacaine and 0.5% Bupivacaine with dexamethasone in supraclavicular brachial plexus block by comparing the onset and duration of sensory and motor blockade, hemodynamic variables and number of rescue analgesics required.

Materials and methods: Following approval by institutional ethical committee, 60 patients posted for elective upper limb surgeries were included and divided into two groups. Group A received 30ml of 0.5% Bupivacaine with 2ml of 0.9% NaCl and group B received a mixture of 30ml of 0.5% Bupivacaine and 2ml of Dexamethasone (8mg). The required parameters were observed and analyzed.

Results: The onset of sensory and motor block was early in Bupivacaine-Dexamethasone group compared with bupivacaine alone. The duration of Sensory and motor block was prolonged with Bupivacaine-Dexamethasone group compared with Bupivacaine alone. The number of rescue analgesics were less in Bupivacaine- Dexamethasone group.

KEYWORDS

Supraclavicular brachial plexus block, Bupivacaine, Dexamethasone, Rescue analgesia.

INTRODUCTION:

Brachial plexus block is a popular approach for upper limb surgeries as an alternative to general anaesthesia. This type of anaesthesia mainly helps in to achieve ideal operating conditions by producing muscular relaxation, maintaining stable intraoperative hemodynamic condition and the associated sympathetic block. In addition, they provide extended postoperative analgesia with minimal side effects. Different adjuvants have been described in literature to hasten the onset and prolong the duration of block. The present study was conducted to study the effect of adding dexamethasone to 0.5% bupivacaine in supraclavicular brachial plexus block.

Use of steroids as adjuvant to local anaesthetic drug in brachial plexus block is gaining popularity. Recently, dexamethasone has been studied as an adjuvant to local anaesthetic in peripheral nerve block.[1] Steroids have nerve block prolonging effects by blocking transmission of nociceptive myelinated c-fibres and suppressing ectopic neuronal discharge. They are also thought to alter the function of potassium channels in the excitable cells. Thus, dexamethasone was selected as an adjuvant to bupivacaine in this study because it has been reported to prolong the duration of action of local anaesthetics with no respiratory depression.[2]

AIMS AND OBJECTIVES OF THE STUDY:

Aim of the study is to compare the effects of 0.5% Bupivacaine and 0.5% Bupivacaine with Dexamethasone in supraclavicular brachial plexus block by comparing the onset and duration of sensory and motor blockade, hemodynamic variables and number of rescue analgesics required.

METHODOLOGY:

This prospective, randomized study was commenced after obtaining approval from the institutional ethical committee. Written and informed consent were taken. 60 patients of either sex with age between 18-65 years and with American society of Anaesthesiologists (ASA) class I and II, who are electively posted for upper limb surgeries under supraclavicular brachial plexus block were selected at Government General Hospital, Kurnool, Andhra Pradesh. Patients of ASA III and IV, with abnormal coagulation profile, on anticoagulant therapy, with history of seizures, uncontrolled hypertension were excluded from the study. In case of failed block, general anaesthesia was given and those patients were excluded from the study.

METHOD OF COLLECTION OF DATA:

Study population is randomly divided into two groups with 30 in each group. Group A received 30ml of 0.5% Bupivacaine with 2ml of 0.9% NaCl and group B received 30ml of 0.5% Bupivacaine and 2ml of Dexamethasone.

Demographic data like age, weight, gender, history, airway assessment, general and systemic examination were recorded.

Baseline investigations like complete blood counts, urine analysis, renal and liver function tests, serum electrolytes, ECG and chest X ray were done in all the patients. Patients were clearly explained about the procedure. All the patients were kept nil per oral for 6hours prior to the procedure. After shifting the patient into operating room, standard monitors as per ASA guidelines were connected and baseline vital parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and oxygen saturation were recorded. IV cannula was secured for the non-operative limb and the pre-medications were given. The patient was positioned supine with head turned away from the limb to be operated. About 2cm above the mid-clavicular point, just lateral to subclavian artery pulsation, a 24G 1.5inch needle was introduced and directed caudally and postero-medially to reach the first rib. Paraesthesia was elicited by "walking over" the first rib and then after negative aspiration, study drug was injected in this area.

The onset of sensory block was evaluated by the pin prick with a 23G needle. The motor block was assessed by using Bromage-three point score [0= normal motor function with full flexion and extension of elbow, wrist and fingers, 1=decreased motor strength with ability to move fingers and/or wrist only, 2= complete motor blockade with inability to move fingers]. The time of onset and duration of sensory and motor blockade was noted. Hemodynamic parameters were monitored and recorded at 0,5,15,30 min,1,2,6,12,24hrs after the block. The number of rescue analgesics (Inj. Diclofenac 75mg IM) required in first 24hrs was noted.

STATISTICAL ANALYSIS:

All results were expressed in Mean± Standard Deviation (SD) or percentage as applicable. Statistical analysis was carried out using Statistical Package for Social Science for Windows Version 25.0. Quantitative data was analysed using student t-test and qualitative data was analysed using chi-square test. Results were considered statistically significant where p-value was less than 0.05.

RESULTS:

The demographic data like age, weight, gender were comparable in both the groups and were statistically insignificant. These are summarized in table.1

Table 1: Age, weight and gender distribution among the two groups.

Parameters	Group A Mean± SD	Group B Mean± SD	p value
Age in years	36.53±11.0	33.48±11.7	0.216 (NS)
Weight in Kgs	56.82±7.23	55.68±6.86	0.57 (NS)
Gender (M/F)	18/12	19/11	0.863 (NS)

NS:-Not significant.

The mean time of onset of sensory and motor blockade were earlier in group B compared to group A, which is statistically significant. Mean duration of sensory and motor blockade was prolonged in group B compared to group A, which is statistically significant. The mean number of rescue analgesic doses were less in group B compared to group A and is statistically significant. These values are summarized in Table 2.

Table 2: Mean time of onset and motor block and the number of rescue analgesics.

Parameters	Group A Mean± SD	Group B Mean± SD	p value
Time of onset of sensory block (minutes)	8.6±1.24	5.6± 0.76	< 0.001 (S)
Time of onset of motor block (minutes)	16.7± 2.15	10.3± 1.46	< 0.001 (S)
Duration of sensory block (hours)	4.0± 0.63	5.9± 0.79	< 0.001 (S)
Duration of motor block (hours)	1.9± 0.52	4.3± 0.93	< 0.001 (S)
Number of rescue analgesics	2.5± 0.51	1.3± 0.44	< 0.001 (S)

P value <0.001 is considered as statistically highly significant. S:-significant.

In the present study, hemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and oxygen saturation between the two groups were compared for the next 24 hours after the block, and the results obtained were statistically insignificant. No significant adverse events were seen in any of the groups.

DISCUSSION:

Supraclavicular brachial plexus block is conducted with anaesthetic agents for upper limb surgeries and it not only provides optimal operating conditions like stable hemodynamics, but also provides post-operative analgesia with minimal side effects. It is desirable both for surgeons and for anaesthesiologists to have prolonged analgesia. One of the believed mechanisms of dexamethasone is to specifically inhibit nociceptive C-fibre transmission. This suggests that dexamethasone may have a direct effect on nerve transmission[1].

In the present study, on comparison of heart rate, systolic, diastolic and mean arterial blood pressure and Sp02 in both groups at different time intervals in first 24hrs, no statistically significant difference was observed. None of the patients had bradycardia or tachycardia, hypertension or hypotension following administration of dexamethasone along with local anaesthetic agent. Our findings corroborated with that of Choi et al.[1], Persec et al[3], and Shrestha[4] et al., who also found no significant difference in haemodynamic parameters on addition of dexamethasone to local anaesthetic.

In the present study, we demonstrated that the addition of dexamethasone to 0.5% isobaric bupivacaine in supraclavicular brachial plexus block results in faster onset of sensory and motor blockade as well as prolonged duration of sensory and motor blockade which is generally consistent with the studies done by Choi et al[1], Pathak et al[2], Persec et al[3], Shrestha et al[4] and Islam et al.[5]

Shrestha et al.[6] confirmed that addition of dexamethasone leads to significantly faster onset of action and prolonged duration of analgesia for brachial plexus block, without any unwanted side effects, which is in concordance with the present study.

Islam et al.[5] concluded that on adding dexamethasone to local anaesthetics in brachial plexus block, the onset occurs significantly earlier and duration is markedly prolonged. No unwanted side effects were noted, which is in concordance with the present study.

In the present study, the number of rescue analgesics required was less in bupivacaine and dexamethasone group compared with bupivacaine group. This is in correlation to Shrestha et al[6], Yadav et al[7], Tandoc et al[8], Ritu baloda et al[9], which concluded that requirement of analgesics in the post- operative period will be less if dexamethasone was given along with bupivacaine for the nerve blocks.

CONCLUSION

To conclude, the addition of 8mg of dexamethasone to 0.5% bupivacaine effectively and safely shortens the onset of sensory and motor blockade, increases the duration of sensory and motor blockade and increases the duration of postoperative analgesia without any haemodynamic disturbances.

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