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Original Research

Assessment of efficacy of Dexamethasone as an adjuvant to Bupivacaine for spinal anesthesia

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***ABSTRACT*:**
Background: Increasing duration of local anaesthetic action is desired for prolongation of postoperative patient comfort, as well as decreasing perioperative opioid consumption and subsequent side effects. In regional anesthesia local anaesthetics alone provide analgesia for not more than 4-8 hours. Increasing the duration of local anaesthetic action is often desirable because it prolongs surgical anaesthesia and analgesia. A number of adjuvant medications have been used in an attempt to prolong regional blockade. **Aim of the study:** To assess efficacy of Dexamethasone as an adjuvant to Bupivacaine for spinal anesthesia. **Materials and methods:** The present study was conducted in the Department of Anesthesia of the Medical institute. For the study, we selected 80 patients scheduled for abdominal surgery with ASA I and II. We excluded patients who were allergic to anesthetic drugs, had systemic disorders which could hamper the results of the study such as diabetes mellitus or bleeding disorders. The patients were randomly grouped into two groups, Group 1 and Group 2 with 40 subjects in each group. Subjects in group 1 were administered intrathecal bupivacaine-dexamathasone; however, subjects in group 2 were administered intrathecal bupivacaine- normal saline. The evaluation of sensory block was done using pin prick test with a short bevel needle along mid-axillary line bilaterally. The assessment was done every 5 minutes awaiting a level 4 sensory level regression till end of the surgical procedure. Anesthesia onset time, sensory block time period, pain free time-period was recorded for each patient. **Results:** There was no statistically significant difference between demographic characteristics of the patients of both groups. The anesthesia onset time for Group 1 was 13.65 minutes as compared to 12.11 minutes for Group 2. The sensory block time period for Group 1 was 129.87 minutes in comparison to Group 2 that was 114.21 minutes. Also, pain free time-period for Group 1 was 214.25 minutes as compared to Group 2 that was 225.54 minutes. **Conclusion**: Dexamethasone with bupivacaine effectively delays the sensory block in spinal anesthesia for abdominal surgeries. Thus, it can be successfully used for spinal anesthesia.
Keywords: Bupivacaine, Dexamethasone, Spinal anesthesia, steroid.

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INTRODUCTION:
Regional anaesthesia has gained much popularity in outpatient orthopaedic surgery. Increasing duration of local anaesthetic action is desired for prolongation of postoperative patient comfort, as well as decreasing perioperative opioid consumption and subsequent side effects. In regional anesthesia local anaesthetics alone provide analgesia for not more than 4-8 hours.[1, 2] Increasing the duration of local anaesthetic action is often desirable because it prolongs surgical anaesthesia and analgesia. A number of adjuvant medications have been used in an attempt to prolong regional blockade. Vasoconstrictors, such as epinephrine, classically have been used to decrease systemic absorption of local anaesthetics by vasoconstricting blood vessels, usually resulting in prolonged analgesia.[3,4] Epinephrine not only acts as a vasoconstrictor but may also produce analgesia through an α2 adrenergic mechanism.1 Additives like opioids, clonidine and verapamil were added to local anaesthetics, but the results are either inconclusive or associated with side effects. Steroids have powerful anti-inflammatory as well as analgesic properties. Perineural injection of steroids

is reported to influence postoperative analgesia. They relieve pain by reducing inflammation, and blocking transmission of nociceptive C-fibres and by suppressing ectopic neural discharge.[5,6] The addition of 5 mg of dexamethasone to 10 ml of 0.5% levobupivacaine in interscalene brachial plexus block showed improvement of postoperative analgesia for arthroscopic shoulder operation without any specific complications.[7,8] Hence, the preset study was planned to assess efficacy of Dexamethasone as an adjuvant to Bupivacaine for spinal anesthesia.

Duration of study : (Six month)

MATERIALS AND METHODS:

The present study is a prospective a randomized controlled double blind studystudy conducted at Department of Anesthesia of the MGM Medical institute.

Total of 80 patients were enrolled for the study & divided into two groups of 40 patients in each group:

Group 1: Administered intrathecal bupivacaine-dexamethasone;

Group 2: Administered intrathecal bupivacaine- normal saline.

INCLUSION CRITERIA:

1. Patients of ASA Grade I and II undergoing Abdominal surgery.
2. Allergic to anesthetic drugs,
3. Age 18 to 65 year
4. Weight 40-90 kg

EXCLUSION CRITERIA:

1.Patients belonging to ASA Grade III and IV
2. Patient's who were had systemic disorders which could hamper the results of the study.
3. Severe coronary insufficiency
4. Myocardial infarction
5. Diabetes mellitus
6. Bleeding disorders
7. Patient refusal

An informed consent was obtained from each patient prior to commencement of the study. The patients were randomly grouped into two groups, Group 1 and Group 2 with 40 subjects in each group. Subjects in group 1 were administered intrathecal bupivacaine-dexamathasone; however, subjects in group 2 were administered intrathecal bupivacaine- normal saline. Administration of spinal anaesthesia was done in the desk-bound projection at L 4 - L 5 level through a midline approach by means of a 25-gauge spinal needle. The evaluation of sensory block was done using pin prick test with a short bevel needle along mid-axillary line bilaterally. The assessment was done every 5 minutes awaiting a level 4 sensory level regression till end of the surgical procedure. Anesthesia onset time, sensory block time period, pain free time-period was recorded for each patient.

Statistical Analysis

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

We included 80 patients for the study. Patients were randomly grouped into two groups, Group 1 and Group 2.

Table 1 shows different demographic characteristics of the patients.

We observed that there was no statistically significant difference between demographic characteristics of the patients of both groups (P>0.05) (Figure 1).

Table 2 shows the comparative analysis of different parameters of anesthesia between Group 1 and Group 2.

The anesthesia onset time for Group 1 was 13.65 minutes as compared to 12.11 minutes for Group 2.There was no statistically significant difference between anesthesia onset time of the patients of both groups (P>0.05) (Figure 2).

The sensory block time period for Group 1 was 129.87 minutes in comparison to Group 2 that was 114.21 minutes.There was statistically significant difference between sensory block time period of the patients of both groups (P=0.05) (Figure 2).

The pain free time-period for Group 1 was 214.25 minutes as compared to Group 2 that was 225.54 minutesThere was statistically significant difference between pain free time-period of the patients of both groups (P<0.05) (Figure 2).

Table 1: Demographic characteristics of patients

Variables	Group 1	Group 2	P-value
Age (years)	40.21	42.54	
Sex ratio (male/female)	25/14	22/18	0.18
Weight (kg)	72.8	68.17	0.21
Height (cm)	160.21	162.41	0.44

Fig 1: Demographic data

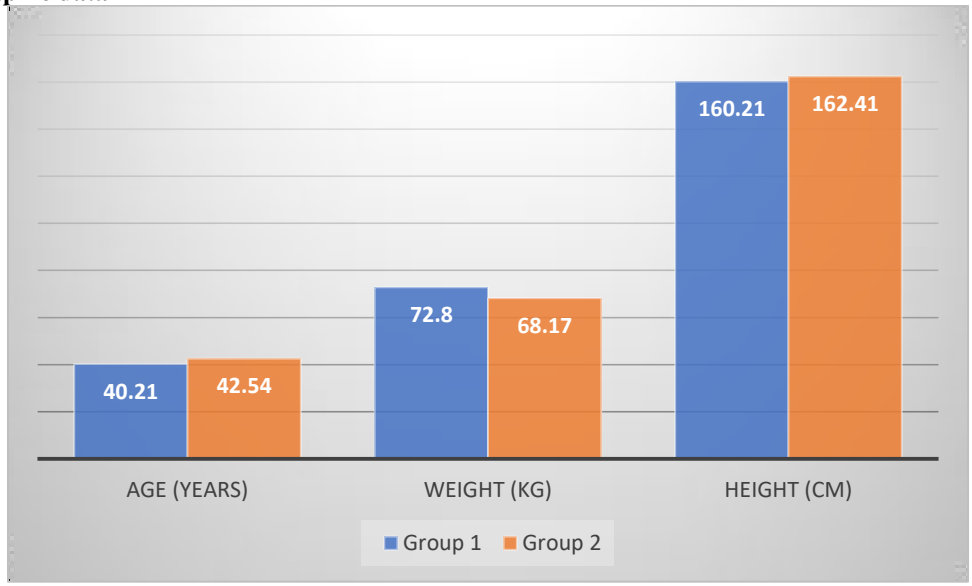
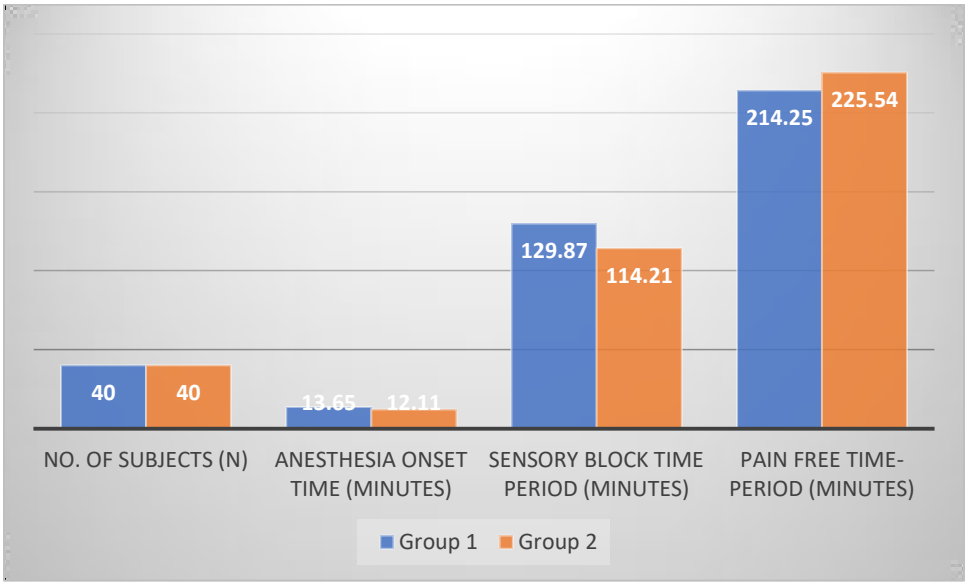


Table 2: Comparative analysis of different parameters of anesthesia between Group A and Group B

Parameters	Group 1	Group 2	P-value
No. of subjects (n)	40	40	
ANESTHESIA ONSET TIME (minutes)	13.65	12.11	0.34
SENSORY BLOCK TIME PERIOD (minutes)	129.87	114.21	0.005
PAIN FREE TIME-PERIOD (minutes)	214.25	225.54	0.002

Fig 2: Anesthetic parameters of Group 1 and 2



DISCUSSION:

In the present study, we observed that the supplementation of spinal bupivacaine with 8 mg dexamethasone altogether drawn out sensory block and postoperative absence of pain contrasted and intrathecal bupivacaine, with no consequences for the onset time of sensory block in abdominal surgery. But the results were statistically non-significant. The results were compared with previous studies and results were consistent with previous studies. Vieira PA et al determined whether the addition of dexamethasone to interscalene brachial plexus block would prolong the duration of sensory analgesia in a group of patients undergoing outpatient shoulder arthroscopy. This investigation was performed on 88 individuals undergoing shoulder arthroscopy. Patients received interscalene brachial plexus block using 20 ml of bupivacaine 5 mg ml(-1) with 1: 200,000 epinephrine and clonidine 75 microg. Patients were randomly assigned to receive either dexamethasone 8 mg or 0.9% NaCl as an adjuvant to the mixture. After discharge, patients recorded pain scores and analgesic consumption in a diary and estimated the time at which they perceived that the sensory block from the interscalene brachial plexus block resolved. Dexamethasone prolonged median sensory and motor blockade compared with the control. At 24 h, the dexamethasone group had lower median verbal analogue scale scores compared with control. At 48 h, the two groups had similar median pain scores. The opioid requirement in oxycodone equivalency was lower in the dexamethasone group than in the control group for the first 24 h, and similar thereafter. Median patient satisfaction scores were not significantly different between the two groups at 48 h. It was concluded that addition of dexamethasone to a bupivacaine-epinephrine-clonidine interscalene block prolongs sensory block and reduces opioid use. Shrestha BR et al evaluated the postoperative analgesia following supraclavicular brachial plexus block with Tramadol or Dexamethasone as an admixture to bupivacaine in upper extremity surgery. Total 60 patients of ASA I and II undergoing upper extremity surgery under brachial plexus block with Bupivacaine were randomly divided in to two groups; one group received Tramadol (2 mg/kg) and the other group received Dexamethasone (8 mg) as an admixture to Bupivacaine. The duration of postoperative analgesia was recorded in both groups using pain VAS score which was determined by maximum VAS score of 8-10 and when patient demands for additional analgesics. The mean duration of postoperative analgesia in the Dexamethasone group was 1028.00 minutes while in the tramadol group it was 453.17 minutes. They concluded that Dexamethasone with local anaesthetic prolongs postoperative analgesia significantly than Tramadol when used as admixture to local anaesthetic in brachial plexus block in upper extremity surgery.[9, 10]

Liu J et al examined the analgesic effect of 3 doses of dexamethasone in combination with low concentration local anesthetics to determine the lowest effective dose of dexamethasone for use as an adjuvant in supraclavicular brachial plexus nerve block. 89 adult patients scheduled for shoulder arthroscopy were included in the study. All patients were randomly assigned into 1 of 4 treatment groups: (i) bupivacaine, 0.25% 30 mL; (ii) bupivacaine, 0.25% 30 mL with 1-mg preservative-free dexamethasone; (iii) bupivacaine, 0.25% 30 mL with 2-mg preservative-free dexamethasone; and (iv) bupivacaine, 0.25% 30 mL with 4-mg preservative-free dexamethasone. All patients received ultrasound-guided supraclavicular brachial plexus nerve blocks and general anesthesia. The median analgesia duration of supraclavicular brachial plexus nerve block with 0.25% bupivacaine was 12.1 hours; and 1-, 2-, or 4-mg dexamethasone significantly prolonged the analgesia duration to 22.3, 23.3, and 21.2 hours, respectively. Dexamethasone also significantly extended the duration of motor nerve block in a similar trend. They concluded that low-dose dexamethasone (1-2 mg) prolongs analgesia duration and motor blockade to the similar extent as 4-mg dexamethasone when added to 0.25% bupivacaine for supraclavicular brachial plexus nerve block. Yadav RK compared effectiveness of addition of Dexamethasone versus Neostigmine to Lignocaine, adrenaline admixtures for Brachial plexus block in providing perioperative analgesia. Ninety patients were randomized in three groups and were received 24 ml of study drugs. The group A [Lignocaine with adrenaline (1.5%)], group B [Lignocaine with adrenaline (1.5%)] +500 microg Neostigmine, and group C (Lignocaine with adrenaline (1.5%) +4 mg Dexamethasone) for brachial plexus block through supraclavicular approach. The observed parameters were onset of analgesia, completion of sensory and motor blockade, Duration of analgesia, Surgeon's score, side effects, number of supplemental analgesics doses and Visual analogue scale (VAS) score for pain in 12 hour of post-operative period. Mean onset of analgesia 4.6+/-1.1 , 4.4 +/-0.8 , 3.8+/-1.8 mins in group A,B and C respectively and the Mean onset of motor blockade were 7.7+/- 2.0, 7.0+/-1.8, 6.0 +/- 2.1 mins in group A,B and C respectively. Similarly Mean Complete sensory block in 10.6 +/-3, 10.4+/-2.5, and 8.9+/-2.2 mins and Mean complete motor block in 17.3+/-4.3, 17.2 +/-4.0 and 14.7+/-3.5 mins in group A, B and C respectively were achieved. Duration of analgesia was 176.5+/-53.5, 225.7+/-53.3 and 454.2+/-110.7 mins in group A, B and C respectively. Duration of analgesia in group C was statistically significant in comparison with other groups. The number of mean analgesic requirement by group C was significantly lower. The mean VAS was significantly lower in group C in 12 hours post-operatively. It was concluded that the onsets of action, duration of analgesia were better in dexamethasone group and also need less number of rescue analgesics requirement.[11, 12]

CONCLUSION:

Within the limitations of the study, we conclude that dexamethasone with bupivacaine effectively delays the sensory block in spinal anesthesia for abdominal surgeries. Thus, it can be successfully used for spinal anesthesia.

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