

Original Article

A COMPARATIVE STUDY BETWEEN CLONIDINE AND DEXMEDETOMIDINE AS AN ADJUVANT TO BUPIVACAINE IN BRACHIAL PLEXUS BLOCK THROUGH USG-GUIDED AXILLARY APPROACH

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ABSTRACT

Objective: To improve the quality of block in regional anaesthesia, several adjuvants are added to local anaesthetic drugs. The effects of clonidine and dexmedetomidine were compared with regard to the onset and duration of sensory and motor block as well as the length of analgesia when used as an adjuvant to bupivacaine in brachial plexus block by axillary approach.

Objective: The present study was conducted to compare the onset time, duration and analgesic efficacy of clonidine vs dexmedetomidine when added as adjuvant to bupivacaine (0.5%) for USG guided brachial plexus by axillary approach.

Methods: This is a prospective, randomized; comparative study conducted in elective unilateral upper limb forearm and hand surgeries. The study was conducted at Government General Hospital, Srikakulam, between March 2023 to September 2023 after obtaining permission from the Institutional Ethics Committee and from the patients. Group BC received 30 ml of 0.5% bupivacaine with Clonidine 1µg/kg (n=30) and Group BD received 30 ml of 0.5% bupivacaine with dexmedetomidine 1µg/kg (n = 30). The onset and duration of sensory and motor block total duration of analgesia were studied in both groups.

Results: The mean time for onset of sensory block in Group BD was 4.7 min, which was lower than Group BC 8.47 min. The mean time for onset of motor block in Group BD was 9.63 min the mean time for total duration of sensory block in Group BD was 537.8 min. This was higher than the Group BC 319.1 min. The total duration of analgesia in Group BD was 666.27 min. This was higher than in Group BC 375.23 min. Bupivacaine dexmedetomidine group had better quality analgesia than the bupivacaine clonidine group.

Conclusion: The addition of Dexmedetomidine (1µg/kg) to bupivacaine (0.5%) in brachial plexus block by USG-guided axillary approach results in a shorter onset time for sensory and motor blockade, prolongs the duration of sensory and motor blockade and also total duration of analgesia.

Keywords: Analgesia, Bupivacaine, Branchial plexus block, Dexmedetomidine

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INTRODUCTION

Brachial plexus blocks provide a useful alternative to general anaesthesia for upper limb surgeries. They achieve near-ideal operating conditions by producing good muscle relaxation, maintaining stable haemodynamics and associated sympathetic block. The sympathetic block reduces the postoperative pain, vasospasm and edema. Although various anaesthetic agents have been used, bupivacaine is a better choice due to its long duration of action of 3 to 8 h. However it has certain disadvantages like delayed onset, patchy or in complete analgesia etc. Clonidine, an alpha-2 agonist which had been used as an antihypertensive initially has sedative, sympatholytic and analgesic properties. It is also known to have anti-nociceptive action and enhances the effect of local anaesthetics when given intrathecally, epidurally and in peripheral nerve blocks [1-3]. This effect is produced by modulating pain pathways through presynaptic alpha-2 adrenergic receptors. It also produces sedation through its action on pontine locus ceruleus where highest numbers of alpha-2 receptors are present. Dexmedetomidine, the recent highly potent alpha-2 agonist, is also a sedative, sympatholytic and analgesic similar to clonidine [4-6]. The peculiar features of dexmedetomidine are its high selectivity for alpha-2 receptors and its ability to produce sedation and analgesia while still maintaining patient arousability and respiratory function [7]. So the present study has been undertaken to compare the onset time, duration and analgesic efficacy of clonidine vs dexmedetomidine when added as adjuvant to bupivacaine (0.5%) for USG guided brachial plexus by axillary approach.

MATERIALS AND METHODS

Study design

This is a prospective, randomized, comparative study.

Study place

The study was conducted in elective unilateral upper limb forearm and hand surgeries.

Study place

The study was conducted at Government General Hospital, Srikakulam between March 2023 to September 2023 after getting permission from the Institutional Ethics Committee and from the patients.

Study group

Group allocation was achieved by a computer-generated randomization list. Group BC received 30 ml of 0.5% Bupivacaine with Clonidine 1µg/kg (n=30). Group BD received 30 ml of 0.5% Bupivacaine with dexmedetomidine 1µg/kg (n=30).

Inclusion criteria

- ASAI, II
- Age 20 to 50 y
- Unilateral upper limb orthopaedic surgeries
- Both sexes

Exclusion criteria

- Patient Refusal
- Patients on adrenoreceptor agonist or antagonist therapy.
- Suspected coagulopathy

- Infection at the site of block
- History of respiratory, cardiac, hepatic/renal failure.
- Patients with medical complications like severe anemia, severe hypovolemia, shock, septicemia.
- Allergy to local anaesthetics and study drug.
- Pregnant women

Methods

Patients were made to lie in supine position with the arm to be blocked, abducted to 90 degrees and externally rotated. After sterilization of the axilla, the Ultrasound probe was placed parallel to the anterior axillary fold to identify the axillary artery and to identify lateral, medial and posterior cords of the brachial plexus in relation to the axillary artery. Then 7-10 ml of drug was injected around each cord of the brachial plexus. The musculocutaneous nerve which supplies the skin of the lateral side of the fore arm had to be blocked by 5 ml of the drug. All the patients were monitored for anaesthesia and analgesia for 24 h post-operatively. Onset time of sensory block was evaluated by eliciting temperature sensation using spirit-soaked cotton over the distribution of the ulnar and median nerve, whereas onset of motor block was assessed by asking the patient to flex the forearm against gravity. The duration of sensory block was noted using Visual Analogue Scale and was found to be statistically significant.

Duration of motor block

The time interval between the administration of local anaesthetic

and there turn of complete motor function of the forearm and hand. Vital parameters like PR, BP and SP02 were monitored every 15 min till 1hr, 2nd hrly till 6 h and 6thhrly till 8 h. IM injection of diclofenac sodium would be given as rescue analgesic when the patient complains of pain. Number of rescue analgesic doses in the first 24 h of the post-operative period was also noted.

Statistical analysis

Data was entered in Microsoft excel for statistical analysis and analyzed with IBM. SPSS 20 and Statistical software version 3.5. Quantitative data will be analyzed using student's unpaired 't' test. Qualitative data will be analyzed by Fisher's chi square test. p value of <0.05 was considered statistically significant.

RESULTS

The mean time for onset of sensory block in Group BD was 4.7 min which was lower than Group BC-8.47 min. This was statistically significant ($p < 0.05$) (table 1 and fig. 1). The mean time for onset of motor block in Group BD was 9.63 min which was lower than Group BC-13.1 min. This was statistically significant ($p < 0.05$) (table 2 and fig. 2). The mean total duration of sensory block in Group BD was 537.8 min. This was higher than the Group BC-319.1 min and was statistically significant ($p < 0.05$) (table 3 and fig. 3). The mean total duration of motor block in Group BD was 466.87 min. This was higher than in Group BC 222.23 min and was statistically significant ($p < 0.05$) (table 4 and fig. 4). The total duration of Analgesia in Group BD was 666.27 min. This was higher than in Group BC-375.23 min and was statistically significant. ($p < 0.05$) (table 5 and fig. 5). Bupivacaine dexmedetomidine group has better quality than bupivacaine clonidine group (table 6).

Table 1: Comparison of onset time for sensory blockade

Group	Mean	SD	P-value	t-value	Significance
Group BC	8.47	1.04	<0.001	17.19	Significant
Group BD	4.7	0.59			

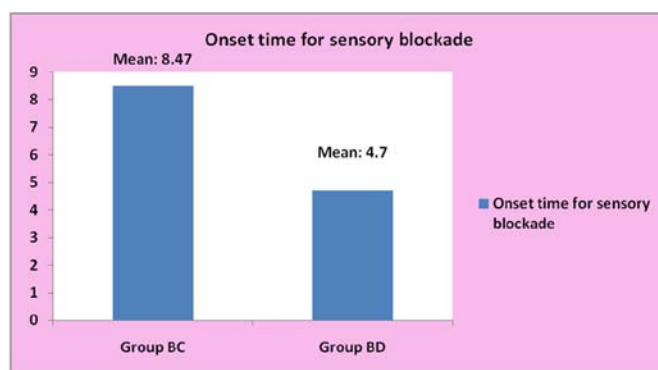


Fig. 1: Onset time for sensory blockade

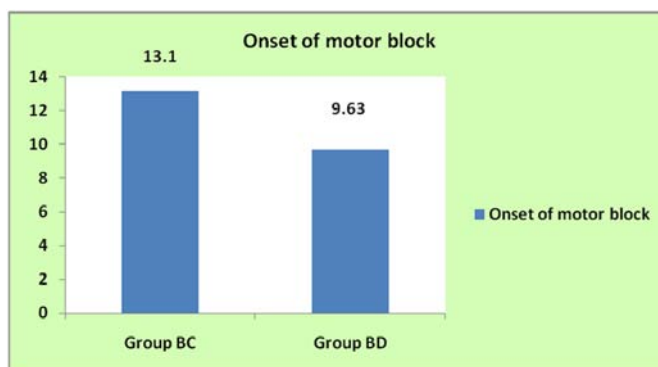


Fig. 2: Onset of motor block between two groups

Table 2: Comparison of onset of motor block between two groups

OTMB	Mean	SD	P-value	t value
Group BC	13.1	1.42	<0.001	11.32
Group BD	9.63	0.89		

Table 3: Comparison of total duration of sensory block between two groups

TDSB	Mean	SD	'P' value	't' value	Significance
Group BC	319.1	32.74	<0.001	25.89	Significant
Group BD	537.8	32.67			

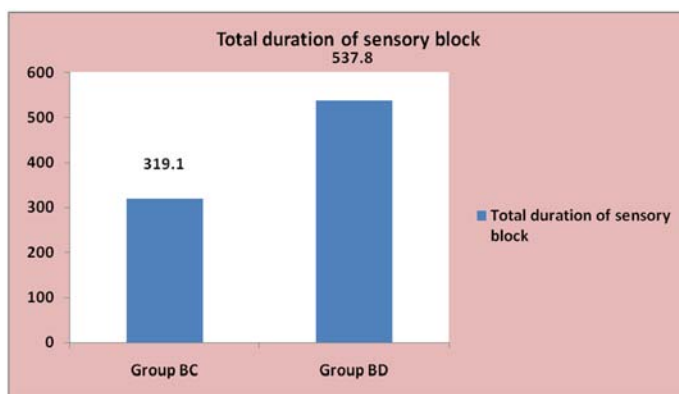


Fig. 3: Total duration of sensory block between two groups

Table 4: Comparison of total duration of motor block between two groups

TDMB	Mean	SD	'P' value	't' value	Significance
Group BC	222.23	17.84	<0.001	40.27	Significant
Group BD	466.87	28.08			

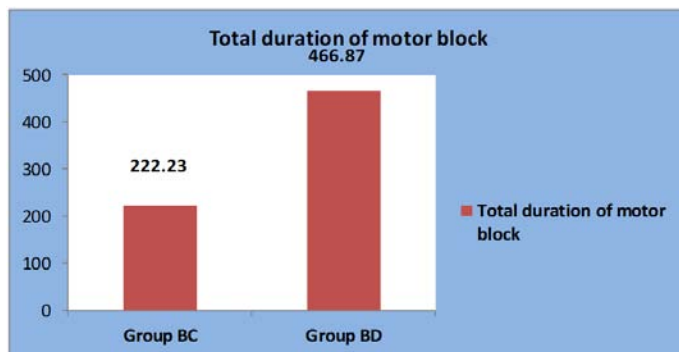


Fig. 4: Total duration of motor block between two groups

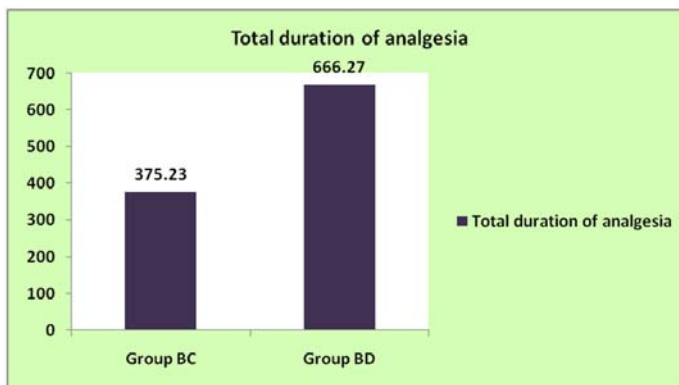


Fig. 5: Total duration of analgesia between two groups

Table 5: Comparison of total duration of analgesia between two groups

DOA	Mean	SD	'P' value	't' value	Significance
Group BC	375.23	32.6	<0.001	32.55	Significant
Group BD	666.27	36.54			

Table 6: Comparison of quality of block between two groups

DOA	Mean	SD	'P' value	't' value	Significance
Group BC	3.13	0.82	<0.001	4.52	Significant
Group BD	3.87	0.35			

DISCUSSION

Brachial plexus block provides post-operative analgesia of short duration, even when a long-acting local anaesthetic like bupivacaine is used alone. The alpha 2 agonists dexmedetomidine and clonidine are known to have analgesic effect and also enhance the effect of local anaesthetics intrathecally and epidurally. There is no statistically significant difference between two groups regarding age, weight and height distribution. The quality of block was more with BD group when compared to BC group ($p < 0.05$), which was statistically significant.

The onset of sensory and motor blockade was shorter in BD group than BC group ($p < 0.05$), which was statistically significant. The total duration of sensory and motor blockade was longer with BD group than BC group ($p < 0.05$), which was statistically significant. The total duration of analgesia was more with BD group than BC group ($p < 0.05$) which was statistically significant. In both the groups, there was no incidence of bradycardia and hypotension noted in 1 case of BD group. Similar to the present study, Tripathi *et al.* (2016) [7] administered with bupivacaine in supraclavicular brachial plexus block, and found that the inclusion of dexmedetomidine improves the quality of anaesthesia and prolongs the duration of analgesic, sensory, and motor block compared to clonidine.

CONCLUSION

The addition of Dexmedetomidine (1 µg/kg) to bupivacaine (0.5%) in brachial plexus block by USG-guided axillary approach results in a shorter onset time for sensory and motor blockade, prolongs the duration of sensory and motor blockade and total duration of analgesia, thereby decreasing the doses of rescue analgesia requirement postoperatively, increasing patient satisfaction and early discharge.

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Nil

AUTHORS CONTRIBUTIONS

All authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

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