



## CLONIDINE AND DEXMEDETOMIDINE AS AN ADJUVANT TO 0.5% LEVOBUPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH RESPECT TO TIME OF ONSET AND DURATION OF SENSORY AND MOTOR BLOCKS- A COMPARATIVE STUDY

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### ABSTRACT

This study was done to evaluate two Alpha two agonists Clonidine and Dexmedetomidine as an adjuvant to 0.5% Levobupivacaine in supraclavicular brachial plexus block. **Methodology:** This study was a prospective observational study done in a tertiary medical college in central India from 1st May 2021 to December 2022 on 60 patients, 30 patients in 2 groups (S and I) admitted for upper limb orthopaedic surgery. **Observation And Results:** In our study we observed that the mean time taken for onset of sensory block was  $8.2 \pm 1.12$  and  $6.2 \pm 1.09$  minutes in Group LC and Group LD respectively and the difference was statistically significant. ( $p < 0.001$ ). The mean time taken for onset of motor block was  $10.46 \pm 1.16$  and  $8.33 \pm 1.32$  minutes in Group LC and Group LD respectively and this difference was statistically significant. ( $p < 0.001$ ). The mean duration of sensory block in group LC was  $7.26 \pm 0.67$  hours and in group LD was  $9.53 \pm 1.2$  hrs and this difference was statistically significant. ( $p < 0.001$ ). The mean duration of motor block in group LC was  $6.86 \pm 0.66$  hours and in group LD was  $8.63 \pm 1.2$  hrs and this difference was statistically significant. ( $p < 0.001$ ).

**KEYWORDS :** Brachial plexus block, supraclavicular, Clonidine, Dexmedetomidine, levobupivacaine.

### INTRODUCTION:

Brachial plexus regional anaesthesia nerve blockade is a time-tested technique for upper limb surgeries has become a mainstay of the anesthesiologists' armamentarium. German surgeon Kulenkampff (1) in 1912 performed the first supraclavicular brachial plexus block. Amongst various upper limb brachial plexus block, the supraclavicular block also known as "spinal anaesthesia of the upper limb" is the most common approach with higher success rate.

Levobupivacaine (S (-)-enantiomer of bupivacaine) with favourable clinical profile and lesser cardiotoxicity when compared with racemic bupivacaine, is being favoured LA for regional block.

Since their synthesis,  $\alpha_2$  adrenergic receptor agonists have been studied for their sedative, analgesic, perioperative sympatholytic and cardiovascular effects. Clonidine is selective  $\alpha_2$  adrenergic drug with some  $\alpha_1$  agonistic property. Dexmedetomidine, a selective  $\alpha_2$ -adrenoceptor agonist has analgesic, sedative, antihypertensive and anaesthetic sparing effects when used in systemic route (2). Dexmedetomidine has also shown to prolong the duration of the block and post-operative analgesia when added to local anaesthetic in various regional blocks (3).

Very few studies have been done to study and compare efficacy and safety of Clonidine and Dexmedetomidone as an adjuvant to 0.5% Levobupivacaine for supraclavicular brachial plexus block in same setting. Keeping all this in mind our current prospective observational study was done.

### Methodology:

This study was a prospective observational study was carried out prospectively in Department of Anesthesiology in a tertiary care hospital after getting approval from ethical committee of institution during period October 2020-september 2023. The total population of 70 patients of age 18 to 60 years scheduled for elective upper limb surgeries e.g. Fracture radius, fracture ulna, fracture both bone forearm, distal 1/3rd humerus etc. were included in the study.

**Inclusion Criteria:** Adult patients of age 18-60 years, ASA grade 1 or 2 and weighing between 50 to 80kg posted for undergoing upper limb orthopaedic surgery and giving consent for the procedure will be included in our study.

**Exclusion Criteria:** Patients unwilling, ASA Grade 3 and 4, those with mental incapacity or language barrier, BMI over 35, anatomical variations, coagulopathy, allergy to amide local anaesthetics and Pregnant Women.

### 70 Patients Were Divided Into 2 Groups By Randomization With 35 Patients In Each Group:

- Group LC (N = 35): patients received 29 mL of Levobupivacaine 0.5% with 1 mcg/kg Clonidine. (Total volume 30 ml).
- Group LD (N = 35): patients received 29 mL of Levobupivacaine 0.5% with 1mcg/kg Dexmedetomidine (Total volume 30 ml).

USG guided supraclavicular block was given. Microsoft excel was used for statistics and Students t test was used to compare means between groups.

### OBSERVATION AND RESULTS:

In our study minimum age of the patient was 18 years and maximum age was 56 years. Mean values for age were comparable in both the groups, the mean age was  $36.82 \pm 9.28$  and  $35.72 \pm 10.2$  in Group LC and Group LD respectively and this difference in age distribution was not statistically significant ( $P = 0.304$ ).

In group LC, 62.9% of the patients were males while 37.1% patients were females. In group LD, 57.1% of the patients were males while 42.9% were females.

The mean weight was  $60.87 \pm 8.65$  and  $63.17 \pm 9.27$  in Group LC and Group LD respectively. Thus, the difference in weight distribution on using unpaired t-test was not statistically significant ( $p = 0.162$ ).

The mean time taken for onset of sensory block was  $8.2 \pm 1.12$  and  $6.2 \pm 1.09$  minutes in Group LC and Group LD respectively and this difference was statistically significant. ( $p < 0.001$ ).

The mean time taken for onset of motor block was  $10.46 \pm 1.16$  and  $8.33 \pm 1.32$  minutes in Group LC and Group LD respectively and this difference was statistically significant. ( $p < 0.001$ ).

The mean duration of sensory block in group LC was  $7.26 \pm$

0.67 hours and in group LD was  $9.53 \pm 1.2$  hrs and this difference was statistically significant. ( $p < 0.001$ ).

The mean duration of motor block in group LC was  $6.86 \pm 0.66$  hours and in group LD was  $8.63 \pm 1.2$  hrs and this difference was statistically significant. ( $p < 0.001$ ).

**DISCUSSION:**

A total of 70 adult patients were studied where we used Dexmedetomidine and Clonidine as adjuvants with  $1\mu\text{g}/\text{kg}$  each with Levobupivacaine in the axillary brachial plexus block.

**I. Demographic Data:** In our study the difference in age distribution, gender-wise distribution and weight-wise distribution was not statistically significant ( $P > 0.05$ ).

**II. Characteristics Of Block**

- a. **TIME TAKEN FOR ONSET OF SENSORY BLOCK:** The mean time taken for onset of sensory block was  $8.2 \pm 1.12$  and  $6.2 \pm 1.09$  minutes in Group LC and Group LD respectively and the difference was statistically significant..
- b. **TIME FOR ONSET OF MOTOR BLOCK:** The mean time taken for onset of motor block was  $10.46 \pm 1.16$  and  $8.33 \pm 1.32$  minutes in Group LC and Group LD respectively and the difference was statistically significant.
- c. **DURATION OF SENSORY BLOCK (IN HOURS):** Patients of both groups were observed for 24hrs. The time was noted when the patient asked for rescue analgesics. The mean duration of sensory block in group LC was  $7.26 \pm 0.67$  hours and in group LD was  $9.53 \pm 1.2$  hrs and the difference was statistically significant.
- d. **DURATION OF MOTOR BLOCK (IN HOURS):** The mean duration of motor block in group LC was  $6.86 \pm 0.66$  hours and in group LD was  $8.63 \pm 1.2$  hrs and the difference was statistically significant.

Our findings related to onset of sensory and motor block and duration of sensory and motor block are in accordance with the studies done by Gopal Krishan et al (2018), Dr. Nipun Lamba et al (2016), Valluri Anil Kumar et al. (2021) and Neelima Tandon et al (2016) as presented in the table below.

Name of study	Onset of sensory block	Onset of motor block	Duration of sensory block	Duration of motor block.
Gopal Krishan et al (2018) (4)	Faster in Group D i.e. $3.58 \pm 0.61$ min. as compared to $6.88 \pm 0.59$ min in Group C. ( $p < 0.001$ )	Faster in Group D i.e. $7.13 \pm 0.89$ min as compared to $8.75 \pm 0.77$ min in Group C. ( $p < 0.001$ )	Longer in Group D i.e. $471.0 \pm 15.1$ min as compared to $242.5 \pm 11.7$ min in Group C. ( $P < 0.001$ )	Longer in Group D i.e. $548.0 \pm 26.6$ min as compared to $295.9 \pm 13.5$ min in Group C. ( $P < 0.001$ )
Dr. Nipun Lamba et al (2016) (5)	Faster in Group D i.e. $8.24 \pm 0.77$ min. as compared to $8.84 \pm 0.85$ min in Group C. ( $p < 0.05$ )	Faster in Group D i.e. $9.36 \pm 0.95$ min. as compared to $10.04 \pm 0.73$ min in Group C. ( $p < 0.05$ )	Longer in Group D i.e. $799.60 \pm 25.74$ min. as compared to $689.20 \pm 25.48$ min in Group C. ( $p < 0.05$ )	Longer in Group D i.e. $693.20 \pm 22.308$ min. as compared to $587.20 \pm 21.70$ min in Group C. ( $p < 0.05$ )
Valluri Anil Kumar et al. (2021) (6)	Faster in Group D i.e. $4.53 \pm 1.07$ min. as compared to $5.90 \pm 0.81$ min in Group C. ( $p < 0.001$ )	Faster in Group D i.e. $7.88 \pm 1.29$ min. as compared to $8.85 \pm 1.81$ min in Group C. ( $p < 0.001$ )	Longer in Group D i.e. $662.50 \pm 50.95$ min. as compared to $567.75 \pm 62.33$ min in Group C. ( $p < 0.001$ )	Longer in Group D i.e. $625.50 \pm 51.95$ min. as compared to $560.62 \pm 67.19$ min in Group C. ( $p < 0.001$ )

Neelima Tandon et al (2016) (7)	Faster in Group D i.e. $8.13 \pm 2.51$ min. as compared to $9.03 \pm 1.60$ min in Group C. ( $p < 0.001$ )	Faster in Group D i.e. $12.13 \pm 2.89$ min. as compared to $15.00 \pm 2.40$ min in Group C. ( $p < 0.001$ )	Longer in Group D i.e. $930.66 \pm 48.02$ min. as compared to $880.16 \pm 55.48$ min in Group C. ( $p < 0.001$ )	Longer in Group D i.e. $811.83 \pm 52.08$ min. as compared to $771.83 \pm 54.19$ min in Group C. ( $p < 0.001$ )
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**CONCLUSION:**

We conclude that Dexmedetomidine is a better adjuvant to Levobupivacaine for supraclavicular brachial plexus block when compared to Clonidine as it provides earlier onset of sensory and motor blockade and prolongs the duration of sensorimotor blockade.

**TABLE 1 showing age and gender-wise distribution of patients in 2 groups**

Characteristic	Group LC	Group LD	P value
Age			0.304 (NOT SIGNIFICANT)
Mean age	36.82	35.72	
S.D.	9.28	10.2	
Gender			0.63 (NOT SIGNIFICANT)
Males	22	20	
Females	13	15	
Weight			0.162 (NOT SIGNIFICANT)
Mean weight	60.87	63.17	
S.D.	8.65	9.27	

**TABLE 2 showing time of onset of sensory and motor block in 2 groups in minutes**

Characteristic	Group LC	Group LD	P value
Time for onset of sensory block			<0.001 Significant
Mean	8.2 min	6.2 min	
S.D.	1.12	1.09	
Time for onset of motor block			<0.001 Significant
Mean	10.46 min	8.33 min	
S.D.	1.16	1.32	

**TABLE 3 showing total duration of sensory and motor block in 2 groups in minutes**

Characteristic	Group LC	Group LD	P value
Total duration of sensory block			<0.001 Significant
Mean	462.67 min	715.33 min	
S.D.	58.66	53.79	
Total duration of motor block			<0.001 Significant
Mean	426.17 min	608.43 min	
S.D.	50.98	51.46	

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