

**COMPARISON OF TWO DOSES OF CLONIDINE AS AN ADJUVANT TO
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ABSTRACT

Background and Aim: Upper limb surgeries are mostly performed under peripheral nerve blocks such as the brachial plexus block. Peripheral nerve blocks not only provide intraoperative anaesthesia but also extend analgesia in the post-operative period with less systemic side effects. Adjuvants to local anaesthetic drugs like clonidine, an alpha-2 adrenergic agonist, improves peripheral nerve block by reducing the onset time, increasing the efficacy of block and extending postoperative analgesia thus improving the quality of block. **Methods:** 60 adult patients of ASA PS I and II undergoing upper limb surgeries under supraclavicular brachial plexus block were randomly allocated to two groups of 30 each. Group A received 3 mg/kg of 0.5% levobupivacaine with 0.5 µg /kg of clonidine and Group B received 3mg/kg of 0.5% levobupivacaine with 1µg/kg Clonidine. The duration of sensory and motor blockade, duration of analgesia, haemodynamic variables and sedation scores were compared. **Results:** Mean time of onset of sensory block was 13.23 ± 1.331 min in group A and in group B was 11.33±1.470 min. Mean duration of motor block was 470.33 ± 30.680 min in group A and in group B was 484±37.941 min and mean duration of analgesia was 828.667 ± 70.0115 min in group A and 813.667 ± 75.9529 min in group B. No patient in either group had developed hypotension, bradycardia and decrease in oxygen saturation. Sedation scores were higher in group B. **Conclusion:** Our study concluded that the two groups were comparable in terms of duration of analgesia, motor blockade and haemodynamic effects. But sedation score was more for higher group B.

KEYWORDS: *Clonidine, Levobupivacaine, Supraclavicular Brachial Plexus Block.***INTRODUCTION**

Upper limb surgeries are mostly performed under peripheral nerve blocks such as the brachial plexus block.^[1] Peripheral nerve blocks not only provide intraoperative anaesthesia but also extend analgesia in the post-operative period with less systemic side effects. Levobupivacaine is an S enantiomer of bupivacaine which possess the same anaesthetic activity as that of racemic bupivacaine but having significantly less cardiac and central nervous system toxicity so levobupivacaine has been shown to be safe and effective for peripheral nerve blockade without compromising the quality of block.^[6, 7, 8, 9] Clonidine, an alpha-2 adrenergic receptor agonist has been used as an adjuvant to local anaesthetic to extend the duration of analgesia in various regional and central neuraxial blocks.^[10, 11, 12, 13, 14] Addition of clonidine to local anaesthetics improves peripheral nerve block by reducing the onset time, increasing the efficacy of block and extending postoperative analgesia thus improving the quality of block which is desirable not only to the surgeon but also to the patient.

MATERIALS AND METHODS

After ethical committee clearance a prospective cohort study was conducted on 60 ASA I or II adult patients undergoing upper limb surgeries under supraclavicular brachial plexus block. Patients were randomly divided into two groups of 30 each. Patients in Group A (n = 30) were administered 3 mg/kg of 0.5% levobupivacaine and 0.5 µg /kg of clonidine and Group B (n= 30) were given 3mg/kg of 0.5% levobupivacaine and 1µg/kg Clonidine. The onset time and duration of sensory and motor blockade and duration of analgesia were recorded. Haemodynamic variables (heart rate, non-invasive blood pressure, oxygen saturation), sedation scores were recorded for 24 hrs postoperatively.

RESULTS

Results were analysed using statistical software SPSS and Quantitative data were analysed by Independent 't' test and qualitative data were analysed by Chi-square test. P value < 0.05 would be considered statistically significant.

Table 1: Demographic variables.

Variables	Group A	Group B	P-value
Age (years)	35.48± 9.06	34.2±8.90	0.591
Sex (M/F)	20(66.7%)/10(33.3%)	19(63.3%)/11(36.7%)	0.787
Weight (kg)	60.17±6.26	61.1± 5.75	0.558

There were no statistically significant difference in the demographic profile of patients in either of the group in term of age, male to female ratio and weight ($p>0.05$).

Table 2: Duration of Motor Block.

Group	N	Mean	Std. Deviation	P value
A	30	470.33	30.680	0.113
B	30	484.67	37.941	

Mean duration of motor block was 470.33 ± 30.680 min in group A and in group B was 484 ± 37.941 min. Statistical analysis showed that no statistically significant difference in the duration of motor block in both groups. (P Value 0.113)

Table 3: Duration of Analgesia.

GROUP	N	Mean	Std. Deviation	P value
A	30	828.667	70.0115	0.430
B	30	813.667	75.9529	

Mean duration of analgesia was 828.667 ± 70.0115 min in group A and in group B was 813.667 ± 75.9529 min. Statistical analysis showed that no statistically significant difference in the duration of analgesia in both groups. (P Value 0.430).

Table 4: Sedation Score.

Group		Sedation Score		Total
		2	3	
A	Count	26	4	30
	% within Sedation	52.0%	40.0%	50.0%
	Count	24	6	30
B	% within Sedation	48.0%	60.0%	50.0%

Sedation score was higher in group B with 6 patients had a sedation score of 3 and in group A 4 patients had a sedation score of 3, but it was statistically not significant (P value = 0.49). In both groups no patients developed a sedation score of more than 3.

No patients in either group developed hypotension, bradycardia and decrease in oxygen saturation in the intraoperative and post-operative period.

During our study we also observed that the onset of sensory block was significantly faster in group B, but the onset of motor block was comparable in both the groups.

Table 5: Onset of Sensory Block.

Group	N	Mean	Std. Deviation	P value
A	30	13.23	1.331	<0.001
B	30	11.33	1.470	

Mean time of onset of sensory block was 13.23 ± 1.331 min in group A and in group B was 11.33 ± 1.470 min. Statistical analysis showed that the time of onset of sensory block was significantly faster in group B compared to group A (P Value <0.001).

Table 6: Onset of Motor Block.

Group	N	Mean	Std. Deviation	P value
A	30	9.73	1.230	0.671
B	30	9.60	1.192	

Mean time of onset of motor block was 9.73 ± 1.230 min in group A and in group B was 9.60 ± 1.192 min. Statistical analysis showed that statistically significant difference in the time of onset of motor block in both groups. (P Value 0.671)

DISCUSSION

Upper limb surgeries can be done under Brachial plexus block which provide intraoperative anaesthesia and also extends analgesia in the post-operative period. Newer amide local anaesthetic Levobupivacaine because of its long duration of action provide better post-operative analgesia. Clonidine when combined with various local anaesthetics prolong the duration of action of local anaesthetics further, but clonidine causes unfavourable haemodynamic effects and sedation at higher doses. The study was undertaken to compare the effects of two doses of clonidine added as an adjuvant to Levobupivacaine in supraclavicular brachial plexus block, in terms of duration of analgesia, duration of motor block, haemodynamic effects and sedation.

A prospective cohort study entitled "Comparison of Two Doses of Clonidine as an Adjuvant to Levobupivacaine for Supraclavicular Plexus Block" was undertaken in Medical College Hospital, Government Medical College Thrissur. After informed consent, 60 ASA class I and II patients posted for various orthopedic surgeries on upper limb were grouped randomly into either Group A clonidine 0.5mcg/kg or Group B clonidine 1mcg/kg. Under aseptic precautions supraclavicular brachial

plexus block was done after neural localization by peripheral nerve stimulator.

Doses of Clonidine selected

Various studies have been carried out to know the minimum concentration of Clonidine that prolongs the duration of analgesia without any side effects. Jean Marc Bernard et al compared three doses of clonidine 30, 90 and 300µg added to 400 mg of lidocaine for axillary brachial plexus block.^[11] Although the study showed a dose dependent prolongation of the analgesic effect, increasing dose of Clonidine was also accompanied by a greater number of adverse effects like hypotension, bradycardia and increased sedation. Thus the authors found out that the clinically useful dose of Clonidine is 30 and 90µg. They also found out that 90µg of Clonidine had minimal side effects but prolonged duration of analgesia.

Francois J Singelyn et al showed that the minimum dose of Clonidine required to significantly prolonging the duration of analgesia and anaesthesia of axillary brachial plexus block was 0.5µg/kg, at this dose Clonidine may be used without important reported side effects.^[12] Adnan T et al used Clonidine as adjuvant to Lidocaine in axillary brachial plexus block in patients with chronic renal failure.^[14] They found that 150µg of Clonidine was very effective in prolonging the duration of analgesia but produced prolonged sedation and thus authors felt that smaller dose than 150µg of Clonidine would be warranted in order to reduce the prolonged sedative effect of Clonidine.

A pilot study was conducted in our hospital in 5 patients using Clonidine 0.5mcg/kg and 1mcg/kg. No adverse effects were observed in both the groups. The duration of analgesia and motor block were comparable in both groups. Hence we selected these doses of clonidine for our study.

Duration of analgesia

Mean duration of analgesia was 828.667 ± 70.0115 min in group A and 813.667 ± 75.9529 min in group B, which was statistically not significant. In Jean J Eledjam et al study the duration of analgesia was 994.2 ± 34.2 min in Clonidine group and 728.3 ± 35.8 min in control group with $p < 0.001$.^[16] In Alemanno et al study duration of analgesia with levobupivacaine alone was 456 ± 174 min.^[15] In Duma et al study the duration of analgesia was 1365 (705-2465) min in group with Clonidine and 1083 (785-1680) min in group without clonidine.^[5]

Duration of motor blockade

The mean duration of motor blockade was 470.33 ± 30.680 min in group A and 484 ± 37.941 min in group B which was statistically not significant. In Piangatelli et al study the duration of motor block with levobupivacaine was 252 ± 48 min. Our results showed that duration of motor block was less compared to sensory block which agrees with the observation by de

Jong et al.^[17] These authors explained that large fibres require a higher concentration of local anaesthetic than small fibres. The minimal effective concentration of local anaesthetic for large (motor) fibres is greater than for small (sensory) fibres. Thus, motor function return before pain perception and duration of motor block is shorter than the sensory block. In our study duration of motor blockade were comparable in both groups.

Haemodynamic effects

In our study no patient in either group had developed hypotension, bradycardia and decrease in oxygen saturation. In Dorothee et al^[10] study bradycardia occurred in Clonidine group. In T Adnan et al^[14] study both bradycardia and hypotension occurred in Clonidine group. But in these studies the haemodynamic changes were not statistically significant even though the incidence were more in Clonidine group.

Sedation

Sedation in our study was assessed by Ramsay sedation scale. Sedation scores were higher in group B, but it was not statistically significant with p value 0.49. In Jean J Bernard et al^[11] study increasing dose of Clonidine was accompanied by a greater sedation score.

During our study we also observed that the onset of sensory block was significantly faster in group B and onset of motor block was comparable in both the groups.

CONCLUSION

In our study we compared two doses of clonidine as an adjuvant to Levobupivacaine for Supraclavicular Brachial plexus block, in terms of, duration of analgesia, motor blockade, haemodynamic effects and sedation scores. From our study we concluded that the two groups were comparable in terms of, duration of analgesia, motor blockade and haemodynamic effects. But sedation score was more for higher concentration of clonidine.

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