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Effect of Clonidine with local anesthesia on duration of analgesia in supraclavicular brachial plexus block: A randomized controlled trial

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ABSTRACT

Introduction: Since the 80's, clonidine has been used as an adjunct to local anesthetics agents in various regional techniques to extend the duration of block. The results of previous studies on the usefulness of clonidine on brachial plexus block have been mixed. **Material and Methods**: To evaluate the efficacy of clonidine, as an adjunct to the ropovacaine in supraclavicular branchial plexuses on the onset and duration of sensory and motor block. **Observations and Results:** the onset of sensory and motor bock is the same whether patients receive ropivacaine alone or in combination with clonidine. However duration of both sensory and motor block is significantly prolonged in Ropivacaine and clonidine group .**Conclusion**: Clonidine Hcl can safely be used as an adjunct to local anesthetic agent in supraclavicular brachial plexus block to enhance onset and duration of sensory and motor block and provide better postoperative pain relief in upper limb surgeries **Key words:** supraclavicular, brachial plexus block, analgesia

Keywords: Menstrual hygiene, adolescent girls, government, private school

INTRODUCTION

The supraclavicular brachial plexus block provides anesthesia of the entire upper extremity in the most consistent and time-efficient manner. Since the 80's, clonidine has been used as an adjunct to local anesthetics agents in various regional techniques to extend the duration of block. The results of previous studies on the usefulness of clonidine on brachial plexus block have been mixed. Some studies have shown that clonidine prolongs the effects of local anesthetics'[1-3] but other studies have failed to show any effect of clonidine, independently from the type of local anesthetic used (ropivacaine, bupivacaine and mepivacaine) [4-7]. This randomized,double blind, placebo-controlled study intends to test the hypothesis that inclusion of clonidine with the local anesthetic prolongs the duration of analgesia in supraclavicular brachial plexus block.

Aims and Objectives:

To evaluate the efficacy of clonidine, as an adjunct to the ropovacaine in supraclavicular branchial plexuses block on the onset and duration of sensory and motor block.

Materials and Methods: This randomized controlled trial was conducted between 10/06/2015 to 09/06/2016. Clearence from ethical Committee was obtained and a written informed consent was taken from the patients. **Study Design:** A randomized controlled clinical trial with parallel enrolment.

Inclusion Patient of both sexes in the age group of 19 to 66 yrs in a weight range of 50 to 97Kgs with ASA I to II physical status scheduled for forearm and hand surgeries.

Exclusion criteria: Patient with allergy to the study medicine, Contraindication to brachial plexus block, Heart conduction block, significant neurological disease in the arm, advanced diabetes with neurological sign and symptoms, renal disease, psychiatry symptoms, pregnancy or refusal to consent.

The subjects were divided into two groups: Group R and Group RC. Patients who received 40 ml of 0.75% of ropivacaine and 0.3ml of normal saline were assigned Group R. Patients who received 40ml of 0.75 % ropivacaine and 50µg (0.3ml) of Clonidine were assigned Group RC. Patients were assessed preoperatively in the pre anesthetic clinic. Written informative consent was obtained. After selecting the patients, following baseline parameters were recorded: Heart rate, systolic blood pressure, diastolic blood pressure, oxygen Saturation and respiratory rate. Premedication was given in the form of 1-2 Midazolam and 50-100mcg Fentanyl. Upon arrival in the theatre an intravenous infusion was established and standard monitors (ECG, NIBP and Pulse Oximetry) were applied.

Position

Patient was placed in the dorsal recumbent position with the head turned away from the site of injection. Lidocaine was used for skin infiltration prior to the block. Supraclavicular block was performed in the spine position with the head turned to opposite side and the arms extended and pulled towards the knee. The mid clavicular point, external juglar vien and subclavian artery pulsations were identified. About 2 cm above the mid clavicular point a 22 G 1.5 inch needle was introduced and directed just lateral to subclavian artery pulsations and a test dose of 2-4 ml of the study drug was injected .

In some cases, a nerve stimulator was used to locate the brachial plexus employing single nerve localization with the threshold current of 0.5 - 1.0 mA. The remaining volume of the study drug was injected slowly in an incremental fashion and then needle was withdrawn.

Sensory and motor blocks on the operated limb were evaluated after the completion of anesthetic injection until the recovery of block.

Sensory Block

Onset of sensory block was defined as the reduction of sensibility to 30% or less. Sensory block was evaluated by pin prick discrimination (22 gauge hypodermic needle) in the cutaneous areas supplied by the axiliary, musculocutaneous, median, radial and ulnar nerve. (Median Nerve: Palmar base of index finger; Ulnar Nerve: Palmar base of little finger; Musculocutaneous Nerve: Along lateral border of forearm over the site of radial artery; Radial Nerve: Dorsum of hand at the base of index finger). The sensory block was graded as; Grade 0: Anesthesia - no sensation felt; Grade 1: Analgesia - dull sensation felt; Grade 2: Sharp pain felt. The time elapsed between injection of the drug and appearance of pain requiring analgesia was taken as duration of sensory block.

Onset of Motor Block was defined as a time elapsed from injection of drug to complete motor block. Motor block was evaluated by thumb abduction (median nerve), thumb adduction (ulnar nerve), thumb opposition (median nerve), and flexion of elbow in supination and pronation of forearm (musculocutaneous nerve). Motor block of the same nerves was graded as Grade0 = No Block; Grade1 = Partial Block; Grade2 = Full Block

Time elapsed between injection of the drug to complete return of motor power were recorded. The brachial plexus block was considered successful by Vester Anderson's criteria when at least 2 out of the 4 nerve territories were effectively blocked.

When the surgical anesthesia was not achieved in a patient even after 30mins from the anesthetic injection the case was considered as failed block and the operation was performed under GA. The presence or absence of tourniquet pain was recorded when a pneumatic tourniquet was used. In order to standardize the adjunct to medications during the surgery, Propofol and Midazolam were allowed for sedation and Fentanyl for break through pain. Local supplementation was not permitted because of the risk of confusing post- operative sensory assessment of the block.

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Following operation all patients were observed in PACU and received rescue analgesia as soon as they complain of any pain. This consisted of Tramadol l00mg and repeated if necessary. Patients were given clear instruction to ask for rescue analgesic as soon as they sensed discomfort caused by pain on the operated hand. The time from the end of the aesthetic injection in the operated hand till the first request for post operative rescue analgesic was recorded in each patient.

OBSERVATIONS, RESULTS AND ANALYSIS: Baseline characteristics of patients are depicted in table 1. Heamodynamic changes in the study population are depicted in table 2.Results of the study are depicted in table 3.

Table No. 1 Baseline characteristics of patients (N=80)

Parameter		R (No/%)	RC (No/%)	Total (No/%)
SEX	Male	29/72.5	30/75	59/73.75
	Female	11/27.5	10/25	21/26.25
Age (years)	<30	21(52.5)	20 (50)	41 (51.25)
	30-40	08 (20)	7 (17.5)	15(18.75)
Weight	>40	11(27.5)	13 (32.5)	24(30)
	<60	23 (57.5)	14 (35)	37 (46.25)
	60-70	7 (17.5)	12 (30)	19 (23.75)
	70-80	4 (10)	4 (10)	8 (10)
	>80	6 (15)	10 (25)	16 (20)

R=Ropivacaine; RC(Ropivacaine+clonidine)

Table 2 depicting heamodynamic characteristics

Parameter	R	RC	P Value
Change in Pulse per minute			
Preoperative	76.03+-13.14	72.6+-12.6	0.23
0	79+-3.32	79.6+-3.9	0.43
5	82.4+-13.7	73.5+-12.3	0.003
10	81+-11.4	75+-15.2	0.046
20	79.7+-9.6	75.9+-14.5	0.16
40	78.5+-11.1	77.9+-14.3	0.82
90	76.3+-11.2	75.8+-13.8	0.98
Systolic BP			
Preoperative	121.27+-9.97	119.42+-9.87	0.25
0	118.7+-10.4	116.7+-10.34	0.19

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5	116.07+-9.95	113.95+-9.52	0.16
10	120.57+-11.51	118.67+-11.56	0.23
20	124.2+-11.3	122.25+-11.04	0.2
40	121.07+-10.34	119.1+-10.19	0.19
90	120.87+-10.01	119+-9.67	0.19
Diastolic BP			
Preoperative	77.1+-8.28	74.13+-8.5	0.12
0	76.75+-8.5	72.8+-6.9	0.03
5	75.83+-8.5	73.8+-14.2	0.45
10	77.3+-8.9	73.9+-8.5	0.094
20	7.3+-9.5	73.9+-8.6	0.02
40	7.9+-9.7	72.6+-9.1	0.04
90	78.8+-7.9	74.4+-9.7	0.03

DISCUSSION

In our study a total of 80 patients were enrolled and finally analyzed. Each group consisted of 40 patients who were comparable in age, sex, weight and ASA grade and heamodynemic characteristics (Table 1-2). We observed that the onset of sensory and motor bock is same whether patients receive ropivacaine alone or in combination with clonidine. However duration of both sensory and motor block is significantly prolonged in Ropivacaine and clonidine group (table 3). There was no difference of complication rates between the studies (table3).

Table 3 depicting study findings and complications rate

Parameter		R	RC	P Value
Onset of sensory block (in minutes)		Mean+-SD	Mean+-SD	
		16.93+-2.41	16.93+-1.48	>0.05
Duration of anesthesia		8.23+-0.37	13.05+-0.46	<0.05
Duration of analgesia		12.66+-0.48	17.73+-1	<0.05
Onset of motor block (in minutes)		19.15+-2.58	19.175+-1.55	>0.05
Post operative analgesia		12.66±0.48	17.73±1.00	<0.05
Complications	Nausea, vomiting, respiratory depression,	0	0	----

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	bradycardia			

R=Ropivacaine; RC (Ropivacaine+clonidine)

The mean onset time (in minutes) of sensory block in various nerves was 16.92 ± 66mins in group R and 16.93± 0.65 mins in group RC. The mean onset time of sensory block was almost comparable in both groups and difference was found to be statistically insignificant (P> 0.05). This result was in accordance with the studies conducted by El Saied AH et al.,[5] Erlacher W et al.[6] and Duma et al.[7]

The duration of analgesia and (in hours) in Group R and RC were, 12.66±0.4 and 17.73±0.1 respectively. The duration of anesthesia (in hours) in Group R and RC were 8.23±0.27 and 13.05±0.46 respectively (p<0.05). A.H. Saied et al. [5] reported similar findings. Our result showed that sensory block tends to be last longer as compared to the motor block as observed by De Jong et al.[8] However Erlacher W, et al.[6] did not find any change in the duration of analgesia with clonidine.

The mean onset time of motor block in all the patients were assessed simultaneously. The mean onset time of motor block was 19.15±63 in group R and 19.176±6 in group RC (p>0.05) . El Saied AH et al.[5], Erlacher W et al.[6] and A. Duma et al. [7] reported similar findings

Duration of motor block was also prolonged in Group RC (13.79±5.47hr) as compared to Group R (10.801±1.58hr). Similar result was observed by H.L. Said et al.[5] However W.Erlacher et al.[6] observed different results.

Post operative analgesia was assessed in the immediate post operative period and regularly at hourly intervals by asking the patient for any complaints of pain. It was found that the rescue analgesia for group R was 12.66±0.48 hrs while for group RC the same was 17.73±1.00 (P<0.01). A.H. El Saied et at al.,[5] Cassati et al[1] also observed the similar results. However Culebras X et al.[4] did not find any analgesic prolongation with clonidine.

Conclusion

Clonidine Hcl can safely be used as an adjunct to local anesthetic agent in supraclavicular brachial plexus block to enhance onset and duration of sensory and motor block and provide better postoperative pain relief in upper limb surgeries.

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