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EFFICACY OF CLONIDINE AS AN ADJUVANT TO 0.5% ROPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR UPPER LIMB SURGERIES.

Dr. Shikha Goyal MD Anaesthesia, Private Practice, Gwalior (M.P.)

Dr. Amol Bansal* MD, Anaesthesia *Corresponding Author

Dr. Anjul Agrawal MD Anaesthesia. Medical Officer, Distt. Hospital, Morena (M.P.)

ABSTRACT We experimented effect of clonidine on characteristics of ropivacaine-induced supraclavicular brachial plexus block. Sixty adult patients were randomly recruited to two groups of 30 each: Group R: 30 ml 0.5% ropivacaine + 1 ml normal saline. Group RC: 30 ml 0.5% ropivacaine + 150 mcg clonidine. The onset of sensorimotor block was earlier in Group RC (3.67± 0.75 min for sensory block and 7.67 ± 1.12 min for motor block) than in Group R (5.5± 0.94 min for sensory block and 12.27 ± 1.84min for motor block). The duration of sensory and motor block and analgesia were prolonged by clonidine ($P < 0.001$). Addition of clonidine in supraclavicular brachial plexus block with ropivaicane decrease the onset and increase the duration of sensory and motor block with prolonged duration of analgesia.

KEYWORDS : clonidine, supraclavicular brachial plexus block, ropivacaine

INTRODUCTION:

In upper limb surgeries regional anaesthesia is a better option for elective and emergency procedures on the hand, forearm and elbow. The supraclavicular technique was used by Kulenkampff in 1912 revealed that the nerves supplying the forearm and arm are geographically grouped closely together in the brachial plexus and a single injection could provide analgesia for the whole limb[1]. Lanz et al(1983) showed that blockade of the brachial plexus with a supraclavicular technique directed near the first rib provides the most reliable and predictable anaesthesia for the upper extremity[2].

Ropivacaine is a pure S(−) enantiomer, structurally related to bupivacine.

Less systemic toxicity is due to its stereo selective properties and less lipophilicity. it produces greater degree of motor sensory differentiation. Clonidine is a selective alpha-2 adrenergic agonist. The concurrent injection of alpha-2 agonist drugs improves the nerve block characteristic of local anesthetics through local vasoconstriction[3] and facilitation of C fiber blockade[4] or spinal action caused by retrograde axonal transport or diffusion along the nerve[5]. The aim of our study was to assess the characteristics of supraclavicular brachial plexus block using 0.5% ropivacaine and to study the effect of clonidine as an adjuvant.

MATERIAL AND METHOD:

After approval of ethical committee this prospective, randomized, placebo controlled study was carried on 60 patients of ASA grade I & II, 18 to 60 years of either sex admitted for upper limb surgeries . Patients with hepatic dysfunction, renal dysfunction, bleeding disorder, progressive neurological disorder, on treatment with α adrenergic antagonists, history of arrhythmias and labile hypertension, known history of allergy were excluded from study.

Preanaesthetic checkup of these patients were done with history, general examination and systemic examination. Routine investigations like cbc, blood sugar, urea, serum creatinin, chest X ray and ECG were done.

After obtaining written informed consent patients were subsequently randomized into 2 groups of 30 each by slip in a box technique.

1. Group R (n=30) : 30 ml of 0.5% Ropivacaine with 1 ml normal saline.
2. Group RC (n=30) : 30 ml of 0.5% Ropivacaine with 150 mcg Clonidine

On arrival in operation theatre an intravenous line was secured in unaffected limb and RL solution was started. Various monitoring devices were connected and basal readings were recorded.

Patients were lying down in supine position with the head turned to contra lateral side and the arms were extended.

The midclavicular point and subclavian artery pulsation were identified. Under all aseptic precautions & after local infiltration of 2% lidocaine 2 ml, a 22G 1.5 inch needle was introduced 2 cm above the mid-clavicular point directed just lateral to subclavian artery pulsation, caudad and medially until paresthesia was elicited. After negative aspiration of blood, the study drug was injected.

After the drug was administered, the following parameters were recorded. Pulse rate (PR), systolic blood pressure (SBP) & diastolic blood pressure (DBP) were noted at 0, 5, 10, 15, 20, and at 30 min interval up to 90 min and then every hour till 750 min.

Motor block was evaluated by thumb abduction (radial nerve), thumb adduction (ulnar nerve), thumb opposition (median nerve), and flexion of the elbow in supination and pronation of the forearm (musculocutaneous nerve). Measurements were performed using a modification of the Lovett rating scale[6].

Grade 6: Normal muscular force
Grade 5 : Slightly reduced muscular force
Grade 4 : Pronounced reduction of muscular force
Grade 3 : Slightly impaired mobility
Grade 2 : Pronounced mobility impairment
Grade 1 : Almost complete paralysis
Grade 0 : Complete paralysis

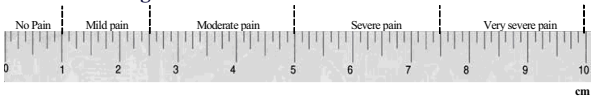
Motor block onset defined as the time elapsed from injection of drug to complete motor block. Assessment was done at every 1 min interval from the time of injection of test drug until the block was established. Only patient with complete motor block (grade 0) were included in study and equal number of new cases were added to complete the study.

Sensory block onset was considered as time interval between injection of drug and complete loss of sensation as analysed by pinprick sensation.

The time interval between local anaesthetic administration and appearance of pain requiring rescue analgesia is mentioned as duration of sensory block.

A visual analogue score scale was used to assessed postoperative pain. It consisted of a 10 cm horizontal scale with gradations marked as '0'means no pain at all and '10'means unbearable pain.

VAS score rating:[7]



VAS score was analysed every 30 min in the postoperative period till the conclusion of study.

Duration of motor block defined as time interval between injections of the drug to complete recovery of motor power (grade 6)

Careful watch was kept for complications such as nausea, vomiting, bradycardia, tachycardia, hypertension, hypotension, haematoma, headache, convulsions and respiratory distress.. The observations recorded in both groups were tabulated and statistical analysis was carried out using independent student's t-test by Medcalc software. p value <0.05 taken as significant.

RESULTS:

Both groups were comparable for age, weight and male:female ratio and statistically insignificant (p>0.05).

Table- 1: Demographic profile of 2 groups.

S.no.	Parameters	Group R		Group RC	
		Mean	±SD	Mean	±SD
1.	Age (yrs)	37.96	14.79	40.03	14.39
2.	Weight (kgs)	66.30	8.85	60.90	4.35
3.	Sex (M:F)	21:9	25:5		

Table 2: Comparison of Study Parameters between two groups

Parameters	Group R		Group RC		P value
	Mean	±SD	Mean	±SD	
Onset time of sensory blockade (min)	5.5	0.94	3.67	0.75	0.00
Duration of Sensory blockade(min)	459.33	19.38	578.33	26.40	0.00
Onset time of motor blockade(min)	12.27	1.84	7.67	1.12	0.00
Duration of blockade (min)	369	18.45	525	31.04	0.00
Time of Rescue Analgesia (in min)	487.33	16.01	609.33	18.56	0.00

The onset time of sensory blockade (mean ±SD) which was 5.5±0.94 min in group R and 3.67±2.751 min in group RC. Mean (±SD) of sensory blockade duration was 459.33±19.38 min in group R and 578.33±26.40 min in group RC. Onset time (Mean ±SD) of motor blockade was 12.27±1.84 min and 7.67±1.12 min in group R and RC respectively. Duration of motor blockade was 369±18.45 min in group R and 525±31.04 min in group RC. Time of rescue analgesia was 487.33±16.01 min in group R and 609.33±18.56 min in group RC. The difference was significant (p<0.001) between 2 groups in respect of onset of sensory and motor blockade. Duration of sensory and motor blockade were increased in group RC. Duration of analgesia was prolonged in group RC as compared to group R (p<0.001).

Basal haemodynamic records were comparable in both groups. Pulse rate was lower significantly up to 450 min and blood pressure was lower up to 570 min in group RC after that the difference was insignificant.

No complication was found in group R while in group RC 2 patients had bradycardia. For treatment inj. atropine 0.6 mg was given IV to these patients.

DISCUSSION:

Supraclavicular brachial plexus block is a safe technique for any surgery in the upper extremity that does not involve the shoulder[8]. This block is performed at the level of nerve trunks, where, almost the entire innervations of the upper extremity are confined to a very small surface area[9]. Ropivacaine with its efficacy, lower propensity for motor block and reduced potential for cardiotoxicity and central nervous system toxicity, appears to be an important option for regional anesthesia and management of postoperative pain[10]. Clonidine enhances both sensory and motor blockade of neuraxial and peripheral nerves after injection of local anesthetic solutions.[11] Clonidine amplifies the Na^+ channel blocking action of local anesthetics by opening up the potassium channels resulting in hyperpolarization[12]. In this study we evaluated the effect of clonidine as an adjuvant with ropivacaine in supraclavicular brachial plexus block. Findings of our study shown that there was rapid onset of sensory and motor blockade with adding of clonidine in ropivacaine. Singh and Aggarwal[9] found similar results. Our findings are at variance with the study of EI Saied A.H. et al,[13] which showed no statistically significant difference in onset time with added clonidine to LA. In our observations duration of sensory and motor blockade were prolonged in group RC as compared to group R. Our observations are in accordance with the findings of EI Saied A H et al [13] who found that addition of clonidine prolongs the duration of sensory (489 vs. 628 min) and motor blockade (721±8 vs. 552 ±35 min respectively)(p<0.01) . These are in accordance with Chakraborty S et al[14] and Baj B et al[15].

Duration of analgesia was longer in group RC. This is due to reducing the release of norepinephrine leading to alpha 2 receptors independent inhibitory effect on nerve fibre action potentials. The prolongation of analgesia observed in our study is consistent with other trials done by Erlacher W et al[16]& Casati A et al[17]. Heart rate and blood pressure was significantly lower in group RC. These supported by Singh and Aggarwal[9]. In group RC 2 patients have bradycardia. Studies by Bernard *et al*.[18] reported the incidence of bradycardia with the use of clonidine.

CONCLUSION:

Addition of Clonidine to ropivacaine significantly increase quality of supraclavicular brachial plexus block by faster onset, prolonged duration of sensory and motor block and improved postoperative analgesia.

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