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CLONIDINE AS AN ADJUVANT TO ROPIVACAINE IN SUBCLAVIAN PERIVASCULAR APPROACH TO BRACHIAL PLEXUS BLOCK

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ABSTRACT

Background and Aim: To evaluate the effectiveness of clonidine as adjuvant to ropivacaine in subclavian perivascular approach to brachial plexus block for prolonging the duration of sensory and motor blockade and analgesia also.

Methods: Patients were randomly divided into two groups. Patients in Group R (n = 30) were administered 25ml of 0.75 % Ropivacaine + 1 ml normal saline and Group RC (n = 30) were given 25ml of 0.75% Ropivacaine + 1ml 150 microgram of clonidine .

Results: The onset and the Duration of sensory and motor block was significantly faster and prolonged in Group RC compared to Group R. Hemodynamic variables did not differ between groups in the post-operative period.

Conclusion: Clonidine 150 microgram in combination with 0.75% Ropivacaine was found to be hastening the onset of sensory and motor block and improved postoperative analgesia in brachial plexus block.

KEYWORDS : Ropivacaine, Clonidine, Brachial plexus Block

INTRODUCTION:

Peripheral nerve blocks are gaining widespread popularity for perioperative pain management because of their distinct advantages over general and central neuraxial anesthesia. Brachial plexus block is sole anesthesia for upper limb surgeries In 1911 Kullenkampff introduced the classic supraclavicular approach of brachial plexus block. Winnie and Collins introduced the subclavian perivascular approach to brachial plexus block Several techniques have been used to prolong the duration of regional anesthesia. Many experimental and clinical studies have shown that Alpha-2 adrenergic agonists like clonidine were able to prolong sensory and motor blockade.

This study involves the addition of an alpha -2 adrenergic agonist, Clonidine to ropivacaine solution in subclavian perivascular approach to brachial plexus block and the effects are evaluated and compared with ropivacaine alone.

MATERIALS AND METHODS:

A prospective double – blinded randomized control study conducted on 60 patients of ASA grade I or II of either sex and age more than 19 years undergoing upper limb surgery, in orthopaedic theatres, under supraclavicular brachial plexus block performed by subclavian perivascular approach with nerve stimulator were included after institutional ethical committee approval. Excluded from the study were Patient refusal, Local infections at the site of block ,history of drug allergy, Coagulation abnormalities ,significant systemic disorders ,Alcohol/drug abuse ,Pregnancy/lactating women , contraindicated to clonidine, Chronic analgesic therapy (other than NSAIDS) ,Peripheral neuropathy and Very obese.

Patients were pre-operatively assessed and the procedure explained and written informed consent was obtained. They were randomly divided into two groups of 30 patients namely- group R and group RC.

No premedication was given to the patients. Intravenous access was obtained, Anaesthesia machine checked, resuscitative equipments and drugs were kept ready. Supraclavicular block was performed by subclavian perivascular approach with nerve stimulator.

In **Group R**: Patients received supraclavicular block with 25ml of 0.75 % Ropivacaine + 1 ml Normal saline

In **Group RC**: Patients received supraclavicular block with 25ml of 0.75% Ropivacaine+ 1ml 150 microgram of clonidine.

Care was taken so that the toxic doses of the local anaesthetics were not exceeded according to the weight of the patients.

Parameters Observed are

1. Onset of Sensory block:

Onset of Sensory block was taken as abolishment of pin prick pain over the distribution of ulnar and median and was assessed every minute after the performance of the block.

2. Onset of motor block:

Onset of motor blockade was assessed every 3 minute after the block using four point scales

0 – Normal power

1-Weakness but able to move arm

2- Not able to move arm but the fingers

3-Complete motor blockade

Attaining a score of 2 was considered as the onset of motor block

3. Duration of surgery: Time taken by the surgeon to do the surgical procedure

4. Duration of motor block: When (3) in the four point scale changes to (2) the motor blockade is said to reverse. The duration of motor block is noted from the time from scale (3) to scale (0)

5. Duration of Sensory block: Taken from the time of onset of block to first complaint of pain sensation (vas score 1).

6. Duration of analgesia: Taken from the time of the onset of block to appearance of pain requiring first supplement analgesia (vas score more than 5).

7. Vital parameters: Pulse rate, blood pressure, saturation were monitored at 2^{nd} , 5^{th} , 10^{th}, 15^{th} minutes and then every 15 minutes for 2hours then hourly for 6 hours then upto 24 hours

8. Sedation Score: Ramsay sedation score was employed

1. Anxious & Alert
2. Conscious & Oriented
3. Sedated, responding to verbal stimulus
4. Responding to mild physical stimulus
5. Responding to moderate & severe physical stimulus
6. Not arousable

9. Side effects: noted are Hypotension, Bradycardia

10. The pain was assessed using visual analogue scale having 10 cm length numbered from 0 to 10. Patient was explained about the visual analogue scale as 0 – No pain and 10 the worst possible pain and was asked the score in visual analogue scale. The patients was observed every 30 minutes after the surgery is over till the motor block reverses and thereafter hourly for 6 hrs; 2 hourly for next 6hrs and than 24 hours. Time at which VAS score is greater than 5 is noted and patient was given intramuscular NSAID.

11. Patients in whom the block was unsuccessful due to total failure of missed dermatomes which needed intravenous supplementation or general anaesthesia were excluded from the study.

OBSERVATIONS AND RESULTS:

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using Epidemiological Information package (2008). Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Krukul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant result.

Table 1: Demographic data of patients in two groups

Parameters	Groups	
	R	RC
Number of patients	30	30
Average Age (years)	38.8 ±13.6 yrs	36.4 ±11.4 yrs
Weight (kgs)	66.7 ± 5.9 kgs	66.9 ± 5.0 kgs
Gender (male : female)	17 : 13	24 : 06
ASA (1:2)	25:5	25:5
Duration of surgery in hours	2.1± 0.6 hrs	1.9 ± 0.5 hrs

There were no differences between the Clonidine and the control groups regarding age, sex, weight, ASA and Duration of surgery in hours [Table 1].

It was observed in Table: 2 that the sensory onset time was faster in Group RC (4.4 ± 0.5mins) than in Group R (8.6 ± 0.5 mins). Similarly, the onset of motor block in Groups R, RC was (10.5 ± 0.5 mins and 8.5 ± 0.8mins) respectively. The mean duration of motor block was (7.2 ± 0.6 hours and 9.4 ± 0.6 hours) in Groups R and RC respectively. The mean duration of sensory block in hours was maximum in Group RC (11.3 ± 0.7 hours) compared to Group R (8.9 ± 0.6 hours).The mean duration of analgesia was (14.083±0.617hours) in Group RC followed by Group R (9.41 ±0.602 hours) respectively.

Table 2: sensory and motor block onset, duration time and duration of analgesia in both groups

	Groups R Mean ± SD	Groups RC Mean ± SD
Onset of Sensory Block(in minutes)	8.6 ± 0.5 mins	4.4 ± 0.5 mins
Onset of motor Block(in minutes)	10.5 ± 0.5 mins	8.5 ± 0.8 mins
Duration of Sensory Block(in hours)	8.9 ± 0.6 hours	11.3 ± 0.7 hours
Duration of Motor Block(in hours)	7.2 ± 0.6 hours	9.4 ± 0.6 hours
Duration of analgesia(in hours)	9.41 ±0.602 hours	14.083±0.617 hours
Sedation Score	2.0 ± 0.0	2.4 ± 0.5

Patients remained haemodynamically stable and also without any complications throughout perioperative period.

DISCUSSION:

Ropivacaine is structurally related to bupivacaine. Ropivacaine with its efficacy, reduced potential for cardiotoxicity and centralnervoussystem toxicity, appears to be an important option for regional anaesthesia and management of postoperative pain[2].

Alpha-2 agonists like clonidine was introduced in the early 1960s as a nasal decongestant.There have been four proposed mechanisms for the action of clonidine in peripheral nerve blocks. These mechanisms are centrally mediated analgesia, alpha-2-adrenoreceptor mediated vasoconstriction, attenuation of inflammatory response and direct action on peripheral nerve[7]. In our study we used 150microgram of clonidine after seeing various studies El Saied et al[1], Singelyn FJ et al[9] and Eledjam et al[8] showing 150microgram as effective dose.

In our study we found that the onset and duration of sensory and motor block was significantly faster and prolonged respectively in patients who received a combination of clonidine and ropivacaine. Our results also showed that sensory block tended to last longer as compared to motor block.

Addition of clonidine to local anaesthetic ropivacaine solution showed prolonged analgesia significantly when compared to ropivacaine alone. Perineurally injected clonidine is thought to exert an analgesic effect through systemic absorption[6].

These results correlate with studies conducted by A.H. Elsaied, M.P.Steyn et. al[1].

Clonidine may produce sedation by acting on locus cerulus of brain stem via action on alpha 2 adrenergic receptor[11]. In group RC since the sedation score was not more than 3, the respiratory function was not compromised.

In this study, no significant difference was observed with respect to the pulse rate, systolic and diastolic blood pressure and saturation after administration of the block in group R and group RC.This could be attributed to the lower dose of clonidine used in our study compared to 300 microgram. In both groups there is no incidence of hypotension and bradycardia. This was consistent with the observation by EL Saied AH and colleagues[1], Casati A[10], and Eledjam JJ and Colleagues[8].

CONCLUSION:

The addition of the clonidine 150microgram can be considered as a safe additive to local anaesthetic solution in subclavian perivascular approach of brachial plexus block shows early onset and prolongs the duration of sensory and motor blockade and also duration of analgesia without any adverse effects.

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