

Clonidine as an adjuvant to ropivacaine(0.5%) insupraclavicular brachialplexus block

P V Bhale^{1*}, Apurva Deshmukh², Pannag Bhushan Dasmohopatra³

¹Professor, ^{2,3}JR Resident, Department of Anesthesiology, MGM Aurangabad, Maharashtra, INDIA.

Email: pramod.bhale@gmail.com

Abstract

Background and Aim: Supraclavicular approach for brachial plexus block has rapid onset and provides complete and predictable anesthesia for entire upper extremity and particularly, hand surgery. In this study, we observed the efficacy and safety of clonidine as an adjuvant to ropivacaine in supraclavicular brachial plexus block. **Method:** Thirty five American society of Anesthesiologist grade I and II adult patients who were scheduled to undergo upper limb hand surgery were selected to receive unilateral supraclavicular block: Ropivacaine 0.5% (30 ml) + clonidine 1 µg/kg. All the patients were assessed for: Onset of sensory block, Onset of motor block, Duration of motor block, Duration of analgesia, Hemodynamic stability, Ramsay sedation score. Anticipated complications such as pneumothorax, hematoma, arrhythmias, tinnitus, dizziness, circumoral numbness and seizures were noted and documented. **Result:** The mean duration of sensory block was 505.1±35.6 min with Ropivacaine and Clonidine. The mean duration of motor block was 438.9±36.3 min with Ropivacaine and Clonidine. The mean duration of analgesia with Ropivacaine and Clonidine was 580.6±36.5 min. **Conclusion:** We conclude that clonidine, 1 µg/kg when added as an adjuvant to ropivacaine in supraclavicular brachial plexus block has significantly prolonged the duration of analgesia along with significant increase in the duration of sensory and motor blockade. Clonidine did not have sedative effect. So clonidine is a better adjuvant in supraclavicular brachial plexus block for upper limb surgeries.

Key Word: Supraclavicular brachial plexus block, clonidine, ropivacaine, post operative analgesia.

*Address for Correspondence:

Dr. P V Bhale, Professor, Department of Anesthesiology, MGM Aurangabad, Maharashtra, INDIA.

Email: pramod.bhale@gmail.com

Received Date: 21/10/2018 Revised Date: 27/11/2018 Accepted Date: 12/12/2018

DOI: <https://doi.org/10.26611/1015837>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
16 December 2018

INTRODUCTION

Modern era can be called as the era of regional anesthesia. Peripheral nerve blocks not only provide intraoperative anesthesia but also extend analgesia in the postoperative period without any systemic side effect. Brachial plexus block is one of the peripheral nerveblockade which has been used for surgeries of upper limb.¹Brachial plexus block can be given either by interscalene, supraclavicular, infraclavicular or axillary

approach. The advantages of a supraclavicular technique over other brachial plexus block approaches are its rapid onset and complete and predictable anesthesia for entire upper extremity and particularly, hand surgery.² Many local anesthetics have been used to produce brachial plexus block. Most common among them being bupivacaine, because of its higher potency and prolonged duration of action. One of the disadvantages is its cardiotoxicity, especially with inadvertent injection into subclavian artery. So ropivacaine was developed with properties similar to bupivacaine, having lower lipid solubility and less cardiotoxicity.³ However the duration of the action of localanesthetics (LA) are short, resulting in conversion to general endotracheal anesthesia which may be sometimes difficult to provide in the middle of the surgery especially in lateral positions. Various methods have been used to extend the duration of analgesia like continuous catheter-based nerve blocks provide very good postoperative analgesia but their placement requires additional time, cost and skill. Using higher volume of local anesthetics is triedbut it may also

increase the risk of LA systemic toxicity. So practice of using adjuvants to local anesthetics is becoming popular.^{4,9} Alpha2 adrenergic agonists become popular because for their sedative, analgesic, antihypertensive, antiemetic actions in addition to reducing the anesthetic drugs requirement. Alpha-2 adrenergic agonists have been tried in combination with local anesthetics, in epidural, intrathecal and peripheral injections, to prolong the duration of anesthesia. Clonidine a partial alpha 2 agonist has been shown to prolong the duration of anesthesia and analgesia in nerve blocks.

MATERIAL METHODS

A randomized, double blind study was performed on patients scheduled for surgery of elbow, forearm and hand at MGM Medical College, Aurangabad after obtaining permission from the ethical committee. The study was conducted on 35 patients. Informed and written consent was taken for each patient. All patients received Ropivacaine 0.5% (30 ml) + Clonidine 1 µg/kg in supraclavicular brachial plexus block.

Inclusion Criteria

1. Scheduled for surgery of elbow, forearm and hand.
2. Age group: 18 to 60 years
3. ASA Grade: 1 and 2
4. Weight group: 50 to 70 kg

Exclusion Criteria

1. Known allergy to studied drugs
2. Infection at the site of block.
3. Pre- existing peripheral neuropathy
4. Bleeding disorders
5. Patient's with 1st, 2nd or 3rd degree heart block
6. Patient's on adrenoceptor agonist or antagonist therapy
7. Pregnant and lactating women

RESULTS

In our study, patients received clonidine 1mcg/kg as an adjuvant to 30 ml of ropivacaine 0.5% in supraclavicular brachial plexus block. The onset of sensory block was 10.63±1.94 min.

Table 1: Duration of sensory block

Duration of Sensory Block (in Minutes)	
	Mean±SD
Ropivacaine+Clonidine	780.3±39

Table 2: Onset of motor block

Onset of Motor Block (In Minute)	
	Mean±SD
Ropivacaine+Clonidine	17.37±1.94

All the patients were informed about the procedure of anesthesia and consequences. Informed and written valid consent was taken. All patients will be kept nil orally for 6 hrs.

Equipment's

- Peripheral nerve stimulator
- A 2mL syringe and 1% lignocaine for skin infiltration
- Marking pen and gloves
- The autoclaved tray containing :
 - A. 22g, 50 mm insulated stimuplex needle
 - B. Two 10 cc syringe
 - C. Skin towel
 - D. Swabs
 - E. Sponge holding forceps

METHOD

In our study sample size of 35 was calculated, taking power of study as 90% (alpha error of 5% and beta error of 95%). Considering the drop rate of 5%, we fixed the sample size (n) as 35 in a group. To make the study double blind one anesthesiologist (caregiver) will prepare the drug and perform the supraclavicular brachial plexus block while second anesthesiologist (investigator) will observe the parameters. The patient was also unaware about drug regimen.

Statistical Analysis: All data was presented as Mean ± SD (Standard Deviation). Demographic data was analyzed using Chisquare test and statistical significance in mean difference was done using student's t test. All statistical analysis was made using SPSS 22 for Windows (Statistical Package for Social Science). P<0.05 was regarded as statistically significant and P>0.05 was regarded as non significant.

Table 3: Duration of Motor block

	Duration of Motor Block (In Minute) Mean±SD
Ropivacaine+Clonidine	711.1±39.5

Table 4: Duration of analgesia

	Duration of Analgesia (In Minute) Mean±SD
Ropivacaine + Clonidine	864.0±44.7

Table 5: Highest Ramsay Sedation Score

Highest Ramsay Sedation Score	(Number of Patients)	Percentage
2	14	40
3	21	60
Total	35	100

Table 6: Mean Pulse Rate

Pulse Rate At minutes-	Mean Pulse Rate Per minute-Mean±SD
0 (baseline)	82.09±9.81
15	80.83±8.38
30	77.57±9.28
45	76.24±9.80
60	76.07±9.52
75	76.24±8.46
90	76.6±8.29
105	76.45±8.90
120	76.83±5.95

Table 7: Mean Arterial Pressure

Mean Arterial Pressure At minutes	Mean Arterial Pressure (mm of Hg) Mean±SD
0 (baseline)	83.2±10.5
15	79.77±8.78
30	79.03±8.62
45	79.8±10.0
60	79.2±10.5
75	77.2±10.1
90	76.1±10.8
105	77.7±11.5
120	79.2±18.4

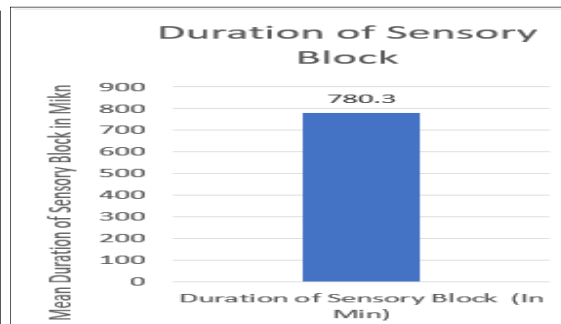
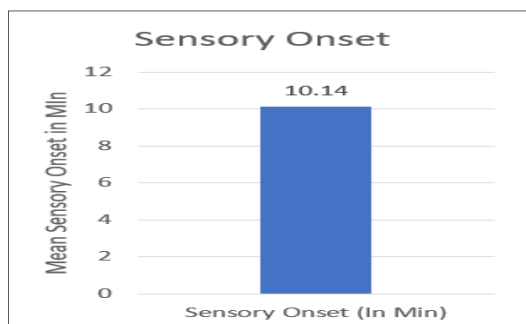


Figure 1: The duration of sensory block was 505.1±35.6 min **Figure 2:** The onset of motor block was 17.66±1.95min

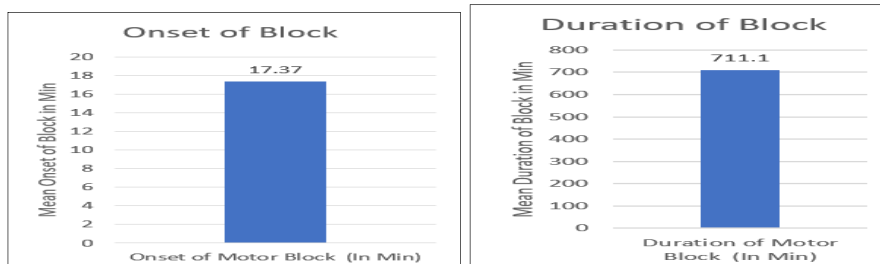


Figure 3: The duration of motor block was 438.9±36.3min **Figure 4:** The duration of analgesia was 580.6±36.5 min thus patient had a statistically longer duration of analgesia

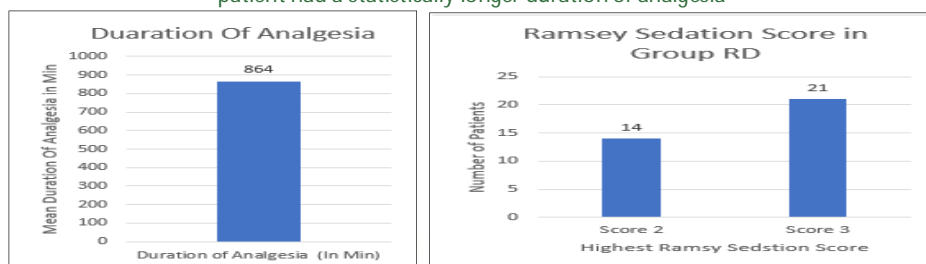
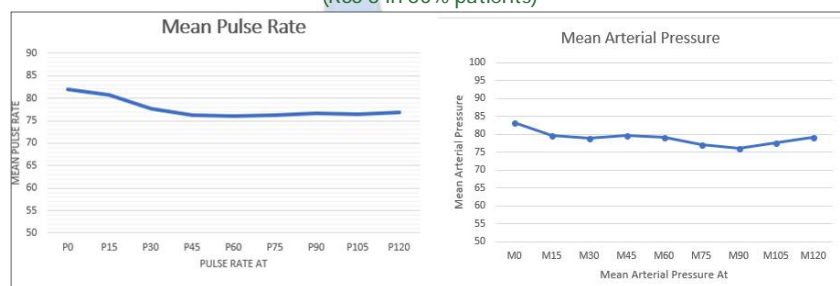


Figure 5: Sedation score was good with clonidine **Figure 6:** Hemodynamic stability was well maintained in all patients (RSS 3 in 60% patients)



DISCUSSION

Brachial plexus block is one of the most commonly performed peripheral nerve blocks in day today practice. It can be used as the sole anesthetic technique or in combination with general anesthesia for intraoperative and postoperative analgesia. Ropivacaine is less lipophilic than bupivacaine and that, together with its stereo selective properties, contributes to ropivacaine having a significantly higher threshold for cardiovascular and central nervous system toxicity than bupivacaine in healthy volunteers. There has always been a search for adjuvants to the regional nerve block with drugs that prolong the duration of analgesia but with lesser adverse effects. Alpha2 adrenergic receptor agonists have been the focus of interest for their sedative, analgesic, perioperative sympatholytic and cardiovascular stabilizing effects with reduced anesthetic requirements. Hence clonidine has been selected as adjuvant in our study. The present study population consists of 35 patients scheduled for surgery of elbow, forearm and hand. Patients received Ropivacaine 0.5% (30ml) with clonidine 1mcg/kg via supraclavicular brachial plexus

block. Characteristics of sensory block, motor block, duration of analgesia, sedation score, Hemodynamic effects and complications were studied in our study.

Characteristics of sensory block: In our study the onset of sensory block was 10.63±1.94 min. The duration of sensory block was 505.1±35.6 min In study of Qazi E Ali *et al*¹⁴ found out that mean duration of sensory block in patients who received 35 ml of 0.5% Ropivacaine in supraclavicular block was 505±95 min and other group in their study who had received Inj. Ropivacaine 0.5%+ inj. Clonidine 75 microgram had a mean duration of sensory block of 726±107 minutes.

In study of Sidharth S Routray *et al*⁵ they found that mean sensory blockade duration in patients who received 35 ml of 0.5% Ropivacaine for axillary block was 390.85 ±72.65 min and other group in their study who had received 0.5% Ropivacaine withinj. clonidine 150 microgram had the duration of sensory block of 484.15±63.4 minutes. Thus duration of sensory block in our study correlates with the duration of sensory block in their study group who had received Inj. Ropivacaine

0.5%+ inj. Clonidine 75 microgram and it is longer than the group who received only Inj. Ropivacaine 0.5% in their study.

Characteristics of motor block: The onset of motor block was 17.66 ± 1.95 min. The duration of motor block was 438.9 ± 36.3 min Qazi E Ali *et al*¹⁴ found out that mean duration of motor block in patients who received 35 ml of 0.5% Ropivacaine in supraclavicular block was 483.50 ± 86 min and other group in their study who had received Inj. Ropivacaine 0.5%+ inj. Clonidine 75 microgram had a mean duration of motor block of 677 ± 86 minutes. In study of Sidharth S Routray *et al*⁵ they found that mean motor blockade duration in patients who received 35 ml of 0.5% Ropivacaine for axillary block was 430.45 ± 68.7 min and other group in their study who had received 0.5% Ropivacaine+inj. clonidine 150 microgram had the duration of sensory block of 550 ± 60.3 minutes. Thus duration of motor block in our study correlates with the duration of motor block in their study group who had received Inj. Ropivacaine 0.5%+ inj. Clonidine 75 microgram and it is longer than the group who received only Inj. Ropivacaine 0.5% in their study.

Analgesia: The duration of analgesia was 580.6 ± 36.5 min Casati A *et al*¹⁵ using 20 ml of 0.75% ropivacaine with clonidine 1mcg/kg noted that the first postoperative analgesic request occurred after 15.2 h (25th-75th percentiles: 10.7-16 h) which was greater than duration of analgesia in group RC. This difference might be due to increased concentration of ropivacaine i.e. 0.75% used in their study. UshaBafna *et al*⁷ using 28 ml of 0.5% ropivacaine with clonidine 2mcg/kg noted the mean duration of analgesia time to be 1016.9 ± 170.1 min which was greater than the mean duration of analgesia in group RC. The difference might be due to increased dose of clonidine i.e. 2mcg/kg used in their study.

Hemodynamic parameters: Hemodynamic stability was well maintained in all patients. This correlates with other studies.

CONCLUSION

We conclude that clonidine, when added as an adjuvant to ropivacaine in supraclavicular brachial plexus block has significantly prolonged the duration of analgesia along with significant increase in the duration of sensory and motor blockade. clonidine also provided better arousable sedative effects without any side effects. So clonidine is a better adjuvant in supraclavicular brachial plexus block for upper limb surgeries.

REFERENCES

1. Damien B, Murhy, Collin JL, Cartney, Vincent WS. Novel analgesic adjuvants for brachial plexus block: A systemic review. *Anesth Analg* 2000; 90:1122-8
2. NYSORA - The New York School of Regional Anesthesia - Supraclavicular Brachial Plexus Block
3. McClure JH. Ropivacaine. *British Journal of Anesthesia* 1996; 76:300-7
4. Casati A, Putzu M. Bupivacaine, Levobupivacaine and Ropivacaine: are they clinically different? *Best Practice and Research Clinical Anesthesiology* 2005; 19: 247-68.
5. Dr. Sidharth Sraban Routray, Dr. Debdas Biswal, Dr. Khageswar Raut, Dr. Debasis Mishra. The Effects of Clonidine on Ropivacaine in Supraclavicular Brachial Plexus Block. *Sch. J. App. Med. Sci.*, 2013; 1(6):887-893
6. Kalyani Nilesh Patil and Noopur Dasmit Singh. Clonidine as an adjuvant to ropivacaine induced supraclavicular brachial plexus block for upper limb surgeries. *J Anaesthesiol Clin Pharmacol.* 2015 Jul-Sep; 31(3): 365-369
7. Usha Bafna, Naresh Yadav, Mamta Khandelwal, Tuhin Mistry, CS Chatterjee, Rajeev Sharma. Comparison of 0.5% ropivacaine alone and in combination with clonidine in supraclavicular brachial plexus block. *Indian Journal of Pain | January-April 2015 | Vol 29 | Issue 1*
8. Dr. Yoginee Satishrao Patki, Dr. Rashmi Bengali, Dr. Tushar Patil. Efficacy of Dexmedetomidine as an adjuvant to 0.5% Ropivacaine in Supraclavicular Brachial Plexus Block for Postoperative Analgesia. *IJSR Volume 4 Issue 1, January 2015*
9. Popping DM, Elia N, Marret E, Wenk M, Tramèr MR. Clonidine as an adjuvant to local anaesthetic for peripheral nerve and plexus blocks: A meta-analysis of randomized trials. *Anesthesiology.* 2009; 111: 406-15.
10. Ramsay MA, Savage TM, Simpson BR, Godwin R. Controlled sedation with alphaxolone-alphadolone. *Br Med J.* 1974; 2: 656-9.
11. Scott DB. Acute toxicity of ropivacaine compared with that of bupivacaine. *Anesth Analg* 1989; 69: 563-9 Ilfeld BM. Continuous peripheral nerve blocks: a review of the published evidence. *Anesth Analg* 2011; 113: 904- 25
12. Capdevila X. Continuous peripheral nerve blocks in clinical practice. *Curr Opin Anaesthesiol* 2008; 21: 619-23
13. Salinas FV. The effect of single injection femoral nerve block versus continuous femoral nerve block after total knee arthroplasty on hospital length of stay and long term functional recovery within an established clinical pathway. *Anesth Analg* 2006; 102: 1234-9
14. Qazi Ehsan Ali, L Manjunatha, Syed Hussain Amir, Shaista Jamil, Abdul Quadir. Efficacy of clonidine as an adjuvant to ropivacaine in supraclavicular brachial plexus block: A prospective study. *Indian Journal of Anaesthesia | Vol. 58 | Issue 6 | Nov-Dec 2014*
15. Casati A, Magistris L, Beccaria P, Cappelleri G, Aldegheri G, Fanelli G. Improving postoperative analgesia after axillary brachial plexus anesthesia with 0.75% ropivacaine. A double-blind evaluation of adding clonidine. *Minerva Anesthesiol.* 2001 May; 67(5):407-12.

Source of Support: None Declared
Conflict of Interest: None Declared