Section: Anaesthesia

Original Research Article

A COMPARATIVE STUDY OF EFFICACY OF DEXMEDETOMIDINE WITH ROPIVACAINE 0.5% VERSUS CLONIDINE WITH ROPIVACIANE 0.5% IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR ELECTIVE UPPER LIMB SURGERIES

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ABSTRACT

Background: Supraclavicular block is superior volition to general anaesthesia for upper branch surgeries and use of ultrasound makes it safe and effective. Ropivacaine, utmost successfully used original anaesthetic with increased threshold for cardiotoxicity, arrhythmogenicity and neurotoxicity, more potent blocker along with adjuvants like dexmeditomidine versus clonidine. The purpose of this study was to assess the relative goods of dexmeditomidie and clonidine added to brachial plexus block.

Materials and Methods: A prospective simple random Study was conducted on 54 patients who were assigned to either receive 20ml ropivacaine 0.5% with dexmeditomidine (1mcg /kg) with 5ml of normal saline(GROUP I) or 20ml of ropivacaine 0.5% with clonidine (1mcg/kg) with 5ml of normal saline(GROUP II) in elective upper limb surgeries under supraclavicular block, using ultrasound.

Results: The onset of sensory and motor block was significantly faster in Group I compared to Group II and duration of sensory and motor blockade remained longer in Group I compared to Group II with P value<0.001 showing high statistically significance. Hemodynamics did not differ between groups.

Conclusion: Addition of dexmeditomidine and clonidine enhances the duration of action, blockade being better with dexmeditomidine than clonidine without any adverse effects.

Keywords: Supraclavicular Brachial Plexus block, Ropivacaine, Dexmeditomidine, Clonidine.

INTRODUCTION

Pain is one of the oldest and most dreadful maladies but treatment of pain remains one of the most formidable challenges with many difficulties and pitfalls. Brachial plexus block is popular for upper limb surgeries. Various approaches to brachial plexus have been described but supraclavicular block approach is easiest and most consistent method for anaesthesia.[1] Bupivacaine is the most frequently used local anaesthetic but Ropivacaine has also been successfully tried recently as ropivacaine is less lipophilic, with high Pka. It is less cardio toxic, less arrthymiogenic, less toxic to central nervous system than bupivacaine and it also has intrinsic vasoconstrictor property.[2]

To prolong the duration of major nerve block, several adjuvant have been used such as clonidine, epinephrine, opioids, dexmedetomidine.[3] Clonidine has been shown to be a valuable adjuvant to major nerve blocks. It is an α2 receptor agonist and has been shown to reduce the time of onset of the block and provides better quality of anaesthesia.[4]

Clonidine when combined with local anaesthetic will extend the duration of nerve block.[5] Dexmedetomidine is newly emerging but not studied much especially in brachial plexus block. And it is a

selective α2 adrenoceptor agonist used as adjuvant to local anaesthesia. It fastens the onset time and has longer duration of block.[6-8]

Objective

Compare the effects of adding dexmeditomidine and clonidine to 0.5% ropivacaine with respect to:

a. Onset of sensory and motor blockade
b. Duration of sensory and motor blockade
c. Efficacy of drugs
d. To compare Post-operative pain levels

MATERIALS AND METHODS

A prospective Study was conducted on 54 patients between 18-65 years of age of both genders who were assigned to either admit 20 ml ropivacaine 0.5 with dexmeditomidine (1mcg/ kg) with 5 ml of normal saline (GROUP I) or 20 ml of ropivacaine 0.5 with clonidine (1mcg/ kg) with 5 ml of normal saline (GROUP II) in optional upper branch surgeries under supraclavicular block, using ultrasound. The study was started after taking Ethical Committee clearance and Informed written consent in Department of Anesthesiology, Vydehi Institute of Medical Science and Research Center, Whitefield, Bangalore from Jan 2019 to June 2020

Inclusion Criteria:

1. Patients aged between 18-65years
2. Both genders posted for elective upper limbsurgery
3. ASA-I and ASA-II patients

Exclusion criteria:

1. Patients refusal for the procedure
2. Emergency surgeries
3. Known case of hypersensitivity reaction
4. Patients with abnormal coagulation profile or on any anticoagulationtherapy
5. Patients with history of DM, hepatic/renal failure/pregnant woman/peripheral neuropathy
6. Patients with cardio-pulmonary disorders& HR less than 60 bpm or on any cardiac drugs
7. Patients with psychiatric disorders

Procedure:

Parameters observed: Sensory onset, duration of sensory block motor block, time when complete motor block was achieved.

Patients were assessed of analgesia as per numerical rating scale 0-10.

All patients were observed for any side effects like nausea, vomiting, dryness, of mouth and complication like pneumothorax, hematoma, local anesthesia toxicity and post-block neuropathy in the intra and 24hr post-operative period. Heart rate, blood pressure, respiratory rate and oxygen saturation were recorded just before the block and at regular intervals thereafter.

Sample size:

The following formula has been used to estimate the sample size.

$$n = \frac{(Z\alpha/2+Z\beta/2)^2 2*\delta^2}{(\mu 1 - \mu 2)}$$

Student t test or Mann Whitney test was used to find the significant difference between the onset of motor and sensory blockade and it is expressed as Mean and SD. Chi Square test were measure the association between the genders, ASA grade and complications with treatment groups and these expressed as frequency and percentage.

RESULTS

54 patients included in the study group. The mean age of Group I was 40.48±10.39 in years and mean age of Group II was 33.56±10.31 and majority of them were male than female.

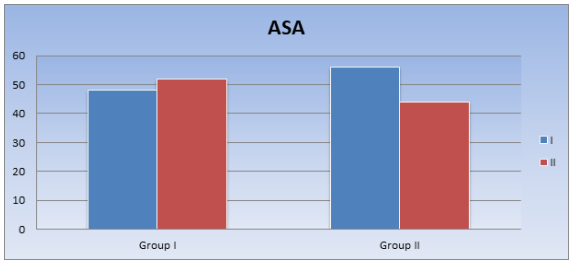

Figure 1: Comparison of ASA Grade I and II between two groups

The onset of sensory blockade was 3minutes in majority of patients (96%) and 4 minutes in 4 % of patients in Group I and 4minutes in majority of patients (89%) and 5 minutes in 11% of patients in Group II

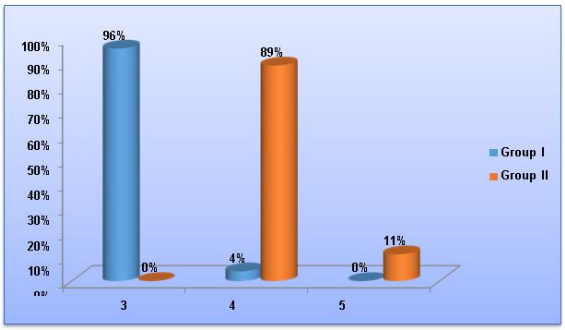

Figure 2: Onset of Sensory block among Group I & II

Onset of motor blocked was faster in Group I compared to Group II and prolonged duration of action in Group I compared to Group II [Table 2].

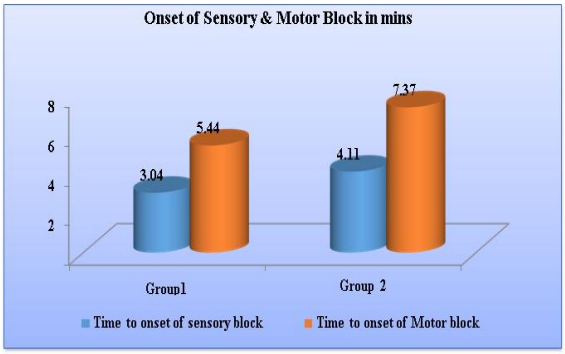

Figure 3: Onset of sensory block and motor block

Table 1: Comparison between gender with Groups

Parameter	Group I	Group II	Total (n=54)	p-value
Male	16 (59%)	22 (81%)	38	0.074
Female	11 (41%)	5 (19%)	16	
Total	27	27	54	

Table 2: Duration of Sensory Block & Motor Block

	Group I	Group II	P-Value
	Mean ± SD	Mean ± SD	
Duration of sensory block(minutes)	907.41 ± 24.11	706.67± 10.74	<0.001
Duration of Motor block(minutes)	815.04 ± 46.96	636.37± 12.92	<0.001

Table 3: Comparison of Time for Sensory & Motor Recovery in Group I & II

	Group I	Group II	P-Value
	Mean ± SD	Mean ± SD	
Time for Sensory Recovery	971.04 ± 16.28	803 ± 19.86	<0.001
Time for Motor recovery	866.15 ± 51.27	665.89 ± 21.75	<0.001

The duration for motor recovery is longer in Group I compared to Group II.

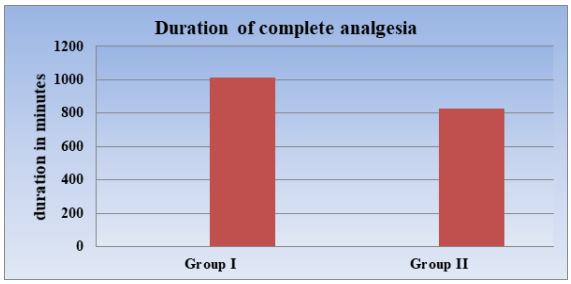

Figure 4: Duration of complete analgesia Group I and Group II

DISCUSSION

Brachial plexus block is proved to be superior alternative to general anaesthesia and is considered to have better postoperative analgesic effect. The use of ultrasound for supraclavicular brachial plexus block has improved the success rate with minimal side effects.[9]

In this study onset of sensory block was 3.04±0.19 with dexmedetomidine group compared to 4.11±0.32 with clonidine group showing faster onset in Group I compared to Group II. Onset of motor block was 5.44±0.51(mins) with dexmeditomidine group compared to clonidine which is 7.37±0.63 (mins). And comparable with study done by Swami SS et al.[10]

They observed that mean onset time of sensory block and the mean onset time of motor block wasearlier and shorter. And the volume duration of sensory blockade with dexmeditomidine group is 907.41±24.11 (mins) compared to 706.67±10.74 (mins) with clonidine group. Duration of motor blockade with dexmeditomidine group is 815.04±46.96 (mins) compared to 636.37±12.92 (mins) with clonidine group showing highly significant.

Kathuria et al,[11] observed, dexmedetomidine (50mcg) when added as adjuvant to 0.5% ropivacaine (30cc) in ultrasound guided brachial plexus block prolonged duration of sensory (789.45±187.72) and motor block (754.60±180.5) which is comparable to the present study.

In this study, they have used fixed dose of dexmedetomidine (50mcg) in all patients with more amount of 0.5% Ropivacaine (30ml) wherein we have used 1mcg/kg dexmedetomidine and 0.5% Ropivacaine (20ml) and have observed the similar results.

A study done by Bharti et al,[12] concluded that dexmedetomidine at 1 µg/kg provided an analgesic effect that lasted as long as 17 hours which is 5 hours more than the duration of control group which is similar to our study. Mangal v et al observed that addition of injdexmedetomidine 1mcg/kg to 0.75% ropivacaine significantly shortened onset of sensory and motor block and also prolonged the duration of analgesia.[13]

Limitations of the Study

Patients belonging to pediatric and geriatric age groups, Emergency surgeries were excluded from the study. Peripheral nerve stimulator was not used in this study which could have further benefited in terms of procedure time and block characteristics

CONCLUSION

Dexmedetomidine at a dose of 1mcg/kg when added as an adjuvant to 0.5% Ropivacaine compared to clonidine at a dose of 1mcg /kg in supraclavicular brachiasl plexus block performed under ultrasound guidance had following benefits:

Faster onset of sensory and motor block, prolonged duration of sensory and motor block, Prolongation of postoperative analgesia, Significantly delays the first demand for analgesia supplementation Hence, 1mcg/kg Dexmedetomidine can be safely used as an adjuvant to 0.5% Ropivacaine in supraclavicular brachial plexus block.

REFERENCES

1. Khanduri KC. Regional Anaesthesia Techniques for Orthopaedic Surgery. Med J Armed Forces India. 2008;64(2):108-110.
2. Kuthiala G ,Chandhary G. Ropivacaine : A review of its pharmacology and clinical use Indian J Anaesthesia .2011;55:104-10

3. Lundblad M ,Trifa M, Kaabachi O et al .Alpha 2 adrenoceptor agonist as adjuvants to peripheral nerve block in children ;a metaanalysis .pediatric anaesth.2016;26:232-238
4. El Saeid AH,Steyn MP,Ansermino JM.Clonidine prolongs the effect of ropivacaine for axillary brachial plexus blockade.Can J Anaesth.2000;47:962-7
5. Rubeena Waheedunnisa ,L .Giridhar ,R Pandu Naik ,T Ram Babu .A comparative study between ropivacaine with clonidine and bupivacaine with clonidine in brachial plexus block in upper limb surgeries .International Journal of contemporary Medical Research 2017;4(5):1128-1133
6. Kanvee V ,Patel K ,Doshi M ,Varina M, Gandha K.Comparative study of clonidine and dexmeditomidine as an adjuvant with ropivacaine in supraclavicular brachial plexus block for upper limb surgeries .J Res Med Den Science 2015;3(2):127-30
7. Zhang Y, Wang CS, Shi JH, Sun B, Liu SJ, Li P, et al. Perineural administration of dexmedetomidine in combination with ropivacaine prolongs axillary brachial plexus block. Int J Clin Exp Med 2014;7:680-5.
8. Bangera A, Manasa M, Krishna P. Comparison of effects of ropivacaine with and without dexmedetomidine in axillary brachial plexus block: A prospective randomized double blinded clinical trial .Saudi J Anaesth 2016 ;10: 38-44
9. More P, Basavaraja, Laheri V. A comparison of dexmedetomidine and clonidine as an adjuvant to local anaesthesia in supraclavicular brachial plexus block for upper limb surgeries. JMR. 2015;1:142–7
10. Sarita S Swami, Varshal M Keniya, Sushma D Ladi, Ruchika Rao. Comparision of dexmedetomidine and clonidine(alpha 2 agonist drugs) as an adjuvant to local anaesthesia in supraclavicular brachial plexus block: A randomized double blind prospective study. Indian J of Anaes 2012;56 (3):243-9.
11. Kathuria S, Gupta S, Dhawan I. Dexmedetomidine as an adjuvant to ropivacaine in supraclavicular brachial plexus block. Saudi J Anaesth. 2015;9:148–54
12. Bharti N, Sardana DK, Bala I. The Analgesic Efficacy of Dexmedetomidine as an Adjunct to Local Anesthetics in Supraclavicular Brachial Plexus Block: A Randomized Controlled Trial. Anesth Analg. 2015;121:1655–60
13. Mangal V, Mistry T, Sharma G, Kazim M, Ahuja N, Kulshrestha A. Effects of dexmedetomidine as an adjuvant to ropivacaine in ultrasound-guided supraclavicular brachial plexus Block: A prospective, randomized, double-blind study. J Anaesthesiol Clin Pharmacol. 2018;34(3):357-361.