ORIGINAL RESEARCH PAPER

Volume-8 | Issue-7 | July - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A COMPARATIVE EVALUATION BETWEEN 0.5% BUPIVACAINE AND 0.75% ROPIVACAINE IN ULTRASOUND GUIDED SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

Anaesthesiology

Dr Ashok Sehgal MBBS, Dept of Anaesthesia and Critical Care, Command Hospital (WC), Chandigarh, India

Dr C S Ahluwalia MD, Dept of Anaesthesia and Critical Care, Command Hospital (WC), Chandigarh, India

Dr Pradyumna Kulkarni* MD, Dept of Anaesthesia and Critical Care, Command Hospital (WC), Chandigarh, India *Corresponding Author

Dr Priya Taank MD,Dept of Ophthalmology, Command Hospital(SC),Pune, India

Dr Shalendra Singh DM, Dept of Anaesthesia and Critical Care, Armed Forces Medical College, PUNE, India

ABSTRACT

Background: Ultrasound assisted Supraclavicular brachial plexus block (BPB) approach has gained popularity because of consistent bony landmarks and less chances of vascular puncture and pneumothorax. The aim is to assess the analgesic efficacy and safety of drug 0.5% Bupivacaine and 0.75% Ropivacaine in BPB patients

Methods: These prospective randomized study patients were allocated into two groups of 30 each to receive either 30 ml 0.5% Bupivacaine (group B) or 30 ml 0.75% ropivacaine (group R). Onset, duration, quality of sensory and motor block and side effects were observed in both groups.

Results: The mean onset of sensory and motor block is earlier in Group R (6.6 ± 0.7, 8.3 ± 0.6 min) than in Group B (7.5 ± 2, 9.4± 2.2 min). The mean duration of sensory and motor block were significantly longer in Group B (7.3±0.2hrs) and (7 ± 0.2 hrs), respectively, than in Group R (5.3±0.1 hrs) and (5 ± 0.1 hrs), respectively ($P < 0.05$). The diastolic blood pressure was significantly less in group R at 5,10 and 15 min after giving block.($p<0.03,0.02,0.01$). There is no difference in complication rate.

Conclusion: Ropivacaine for ultrasound guided supraclavicular BPB has early onset, short duration of sensory and motor blockade and postoperative analgesia without an increase in side effects.

KEYWORDS

Brachial plexus block, Bupivacaine, Ropivacaine, Ultrasound

INTRODUCTION

Regional anesthesia (RA) techniques is gaining importance over general anesthesia (GA) as it provides excellent pain control, diminish side effects and lessen hospital stay for upper limb surgeries. It's also maintaining perioperative haemodynamics along with adequate muscular relaxation. Ultrasound assistance in supraclavicular brachial plexus block (BPB) is the newer real-time imaging modality helps early recognisition of anatomical structure and needle advancement, enhance the success and quality of block and reduce unmeant complications rate such as inadvertent pneumothorax and intravascular injection. [1]

Ropivacaine is a propyl analog of bupivacaine having similar pharmacology to bupivacaine with wider safety margin due to its reduced lipophilicity resulting in low toxicity profile. Very few studies are available, where these two drugs were compared for supraclavicular BPB. Hence the present study was designed to compare the effect of bupivacaine and ropivacaine, in terms of onset and duration of sensory and motor block, postoperative analgesia, side effect and complications in infraclavicular BPB.

MATERIALS AND METHOD

This study was carried out at the tertiary care hospital in India. After Approval from the Institutional Ethics Committee, written informed consent was obtained from the patients. A total of 60 patients' between20 and 60 years of age, undergoing surgery of the upper limb or hand under supraclavicular BPB were enrolled for this prospective randomized study. Patients with BMI > 30 Kg/m^2, coagulopathy, known allergies to the study drugs and any chronic illness were excluded from the study. According to a computer-generated randomization chart, the patients were assigned to one of the two treatment groups. Patients in group R received 30 ml of 0.75% Ropivacaine and patients in group B received 30 ml of 0.5% Bupivacaine. Linear visual analogue scale (VAS) on 0-10 cm will be explained to the patients day prior to surgery for the assessment of pain (0 = no pain, 10= worst pain imaginable).

In Operation Theater with standard basal monitoring and running IV line all patients were pre- medication with Inj Midazolam 0.5 mg IV. The patient will be lying supine with head turned at 45 degree to the contralateral side. With the above maintained position the ultrasound probe will be placed in supra clavicular fossa to visualize the subclavian artery and brachial plexus in the transverse sectional view. After local anesthetic (2% Lignocaine), A 22-gauge 50-mm insulated block needle will be placed on the outer (lateral) end of the ultrasound probe. Once the needle will reach the brachial plexus cluster, a nerve stimulator will be turned on, starting from 0.5 mA and increasing up to 1.5 mA (maximum) to elicit muscle twitch. Thereafter 30 mL of drug injected. A constant watch will be kept for observed development of any complications and haemodynamics. Baseline Hemodynamic parameter values will be noted pre operatively. Patients will be evaluated for sensory and motor characteristics of the block (onset, peak and duration). A score of 2 for sensory and a score of 3 for motor blockage will be taken as successful block. (0= Sharp pain, 1= Dull response to pin prick, 2= No response to pin prick) and (0= No Paralysis, 1= wrist flexion (onset), 2= elbow flexion, 3= complete block (peak). Variation in hemodynamics more than 20% from base line will be considered significant. Postoperatively, pain will be assessed using VAS explained to the patient preoperatively. Postoperatively, when VAS score will be equal to or more than 4 (duration of analgesia), Inj. Diclofenac 100 mg IV will be given as rescue analgesics. Surgeon will be asked to rate his experience as satisfactory, neutral or unsatisfactory.

The data will be systematically collected, compiled and statistically analysed after the completion of the study. Data will be summarized as mean ± standard deviation or as percentages. Numerical variables will be normally distributed and compared using Chi Square test for non-parametric data and Student 't' test for parametric data using SPSS software.

RESULTS

Demographic parameters and clinical characteristics were comparable between the groups. Of them 93% were males and most of them belonged to ASA physical status I. (Table 1) The mean onset of sensory and motor block is earlier in Group R (6.6 ± 0.7, 8.3 ± 0.6 min) than in Group B (7.5 ± 2, 9.4± 2.2 min). The peak of sensory and motor block was significantly less in group R.(Table1) The mean duration of sensory and block were significantly longer in Group B (7.3±0.2hrs) and (7 ± 0.2 hrs), respectively, than in Group R (5.3±0.1 hrs) and (5 ±

0.1 hrs), respectively (P < 0.05). The diastolic blood pressure was significantly less in group R at 5,10 and 15 min after giving block.(p<0.03,0.02,0.01). (Table 2) The mean VAS score 10 minutes before the block for group B is 6.3± 2.1 and for group R is 06.3 ± 2.6 (p<0.9).The mean VAS score 20 minutes after the block for group B is 00.07 ± 0.36 and for group R is 00.0 ±00.0(p=0.32). The complications in form of hypertension were noted in two patients in group B. Otherwise, patients remained hemodynamically stable in both the groups and no other complication noticed in either group. The patient acceptance in group B and group R was good suggesting that patients in both groups are equally satisfied.

Table 1. Basic demographic profile and sensory and motor block characteristics profile

	GROUP B (n = 30)	GROUP R (n = 30)	P value
Age(years)	35.3 ± 9.1	35.4 ± 10.8	0.94
Sex(M/F)	26/4	28/2	0.54
Weight(Kg)	73.2 ± 8	75 ± 7.5	0.3
ASA(I/II)	27/3	29/1	0.3
Onset of sensory block(Min)	7.5 ± 2	6.6 ± 0.7	0.28
Onset of motor block (minutes)	9.4± 2.2	8.3 ± 0.6	0.21
Peak Of sensory block (minutes)	15.8 ± 3.5	12.4 ± 1.3	0.00 1
Peak Of motor block (minutes)	18.3± 3.9	14.5 ± 1.5	0.00 1
Mean duration of sensory block (hours)	7.3±0.2	5.3±0.1	0.001
Mean duration Of motor block (hours)	7 ± 0.2	5 ± 0.1	0.0001

 # M-Male-Female, ASA-American society of anaesthesiology

Table 2. Heart rate, Systolic and diastolic blood pressure of group R and group B (values expressed as mean± SD or number) at various time points in the groups. HR-Heart Rate, SBP-Systolic Blood Pressure, DBP-Diastolic blood pressure, T0=Preoperative reading,T1= 5 min after block, T2= 10 min after block , T3- 15 min after block , T4- 30 min after block.

		Group B(n=30)	Group R(n=30)	P Value
HR	**T0**	75.2 ± 7.5	78.6±6.2	0.06
	T1	77±7.7	79.6±5.7	0.15
	T2	77.4±6.5	78.1±6.1	0.65
	T3	75.7±6.8	76.4±6.6	0.68
	T4	71.2±6.7	74±4.7	0.06
SBP	**T0**	120.8±8.7	123.4±9.2	0.26
	T1	123.9±8	121.8±10	0.36
	T2	156.2±8.8	118.1±9	0.26
	T3	116.8±8.9	116.8±7.6	0.97
	T4	115±7.1	115.7±5.1	0.66
DBP	**T0**	79.2±4.3	79.1±4.2	0.90
	T1	80±40.2	77.4±5	0.03
	T2	78.2±4.7	75.5±4.4	0.02
	T3	76.6±5	73.7±3.2	0.01
	T4	75.6±2.9	74.2±3.9	0.12

DISCUSSION

In the present study, we studied the perioperative anaesthesia effects of two drugs used for USG-guided supraclavicular BPB. Klein *et al*. compared the efficacy of bupivacaine 0.5%, and different concentration of ropivacaine 0.5% or 0.75%. [2] They used 30 ml in each group. Contrary to our study, they revealed that there wasn't any signifcant difference in time of onset and recovery. We used Upto 30 ml of 0.5% bupivacaine thus being equal to 150 mg of bupivacaine which is well within the maximum recommended dose of Bupivacaine. Our dose of Ropivacaine is 30 ml of 0.75% thus being equal to 225 mg of Ropivacaine which is also well within maximum recommended dose for BPB.

A study conducted by Gonuguntla SB, where the onset of sensory block was faster with 0.75% of Ropivacaine when compared to 0.5% of bupivacaine.[3] Contrary to our study, they revealed that there were no much clinical differences in onset, duration and analgesia among 0.5% bupivacaine and 0.75% Ropivacaine. Studies such as Raeder et al [4] and McCrae et al [5] documented that the onset time of both sensory and motor blockade between 11 and 20 min. These differences may be attributing to the anatomic location of the different nerve blocks (supraclavicular, interscalene, and subclavicular) and the technical procedure used. The incident of complications were evidently reported less in our study. The probable reason being the previous study conducted the block without ultrasound guidance.

Finally to conclude, use of ropivacaine hastens the onset of sensory and motor block and lessens the duration of sensory and motor block, thereby providing diminish postoperative analgesia without producing any significant side-effects as compared to bupivacaine.

REFERENCES

1. Kaushal A, Bindra A, Singh S. Mobile phone holder as an ultrasound transducer stabilization device: A novel technique. Indian J Anaesth. 2018; 62(8):635–636.
2. Klein SM, Greengrass RA, Steele SM, D'Ercole FJ, Speer KP, Gleason DH, et al. A comparison of 0.5% bupivacaine, 0.5% ropivacaine, and 0.75% ropivacaine for interscalene brachial plexus block. Anesth Analg 1998; 87:1316-9.
3. Gonuguntla SB. Effect of 0.5% Bupivacaine Versus 0.75% Ropivacaine - Onset, Duration and Quality of Brachial Plexus Block through Supraclavicular Approach. Int J Sci Stud 2016; 3(11):244-248.
4. Raeder JC, Drøsdahl S, Klaastad O, Kvalsvik O, Isaksen B, Strømskag KE, et al. Axillary brachial plexus block with ropivacaine 7.5 mg/ml. A comparative study with bupivacaine 5 mg/ml. Acta Anaesthesiol Scand 1999; 43:794-8.
5. McCrae AF, Jozwiak H, McClure JH. Comparison of ropivacaine and bupivacaine in extradural analgesia for the relief of pain in labour. Br J Anaesth 1995; 74:261-5.