VOLUME - 10, ISSUE - 08, AUGUST- 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Anaesthesiology

A CLINICAL COMPARISON OF 0.75% ROPIVACAINE AND 0.5% BUPIVACAINE FOR SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR UPPER LIMB SURGERIES

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ABSTRACT

Background- This study has been designed to evaluate the efficacy and safety profile of Ropivacaine in producing sensory and motor blockade as compared to Bupivacaine for supraclavicular brachial plexus blockade.

Methods-A prospective randomized double blind clinical study was undertaken in Southern Railway Headquarters hospital, Perambur, to compare the sensory and motor blocking properties of 0.75% Ropivacaine with 0.5% Bupivacaine

Results- There was no statistically significant difference in the onset of sensory blockade between 0.75% Ropivacaine and 0.5% Bupivacaine. There was no statistically significant difference in the onset of motor blockade between the 0.75% Ropivacaine and 0.5% Bupivacaine. There was no statistically significant difference in duration of sensory blockade between 0.75% Ropivacaine and 0.5% Bupivacaine. There was no statistically significant difference in duration of motor blockade between 0.75% Ropivacaine and 0.5% Bupivacaine. There was no statistically significant difference regarding the duration of analgesia with Ropivacaine 0.75% compared to Bupivacaine 0.5%.

Conclusion-The present study concluded that 30 ml of 0.75% Ropivacaine in supraclavicular brachial plexus block is a safe dose, allowing practitioner to produce a fast onset and long duration of peripheral nerve block with excellent postoperative analgesia and stable haemodynamics. In comparison to Bupivacaine, Ropivacaine provides similar onset and duration of sensory block, onset and duration of motor block and postoperative analgesia.

KEYWORDS : Ropivacaine, Bupivacaine, Anagesia.

INTRODUCTION

Peripheral nerve blocks provide an ideal operating condition when used optimally. They are said to cause least interference with the vital physiological functions of the body with reduced stress response and avoiding polypharmacy with an alert and cooperative patient when compared to the conventional techniques. Adequately administered regional anaesthesia can, not only provide very excellent intraoperative anaesthesia but also good post operative analgesia. [1]

Various local anaesthetics have been used to produce brachial plexus block. Bupivacaine 0.5% is one of the most popular drugs used because of its higher potency and prolonged duration of action. One of the drawbacks of Bupivacaine is its cardiotoxicity especially when accidental intravascular injection of the drug occurs. [2] The cardiotoxicity may be life threatening as the dysrhythmias that are produced are resistant to all routinely used antiarrhythmics. Hence there is a need for a drug which can have all the advantages of Bupivacaine without its cadiotoxicity.

Ropivacaine, an amide local anaesthetic similar to Bupivacaine in structure, introduced in 1996 as a suitable replacement to Bupivacaine, is considered to be less cardiotoxic and neurotoxic. [3,4] Structurally it is single s-enantiomer when compared to Bupivacaine, which is racemic mixture and a propyl side chain replaces the butyl group in Ropivacaine. The smaller side chain and single (s)-isomer contributes to its less toxicity and better safety profile.

Ropivacaine has been recently introduced into India. Not many studies have been done on using Ropivacaine for supraclavicular brachial plexus block in India. Some studies done on comparing Bupivacaine and Ropivacaine found no significant differences in motor or sensory effects in between these drugs.

Some studies found Ropivacaine produced faster onset of block and blocks of shorter duration than those induced by Bupivacaine. [5] Hence this study has been designed to evaluate the efficacy and safety profile of Ropivacaine in producing sensory and motor blockade as compared to Bupivacaine for supraclavicular brachial plexus blockade.

MATERIAL AND METHODS

Study Area:

This study was conducted in Southern Railway Headquarters Hospital, Chennai.

Study Design:

Randomized double blind controlled study. The study population was randomly allocated to either of the following intervention groups.

- Group B= Bupivacaine group
- Group R= Ropivacaine group

Study Population:

All the subjects undergoing upper limb orthopedic surgey using supraclavicular brachial plexus block and fulfilling following inclusion criteria were included as study subjects.

Inclusion Criteria:

1. Adult patients aged between 18-55 yrs.
2. Patients with ASA grade 1 and 2 physical status
3. Patients scheduled for elective surgery under brachial plexus block.
4. Patients with no history of allergy or sensitivity to any of the study local anaesthetics.

Exclusion Criteria:

Patients with

1. Age < 18 yrs, > 55 yrs

2. Patients with ASA grade 3 and 4 (with significant cardiovascular, central nervous system problems, renal failure, hepatic dysfunction, uncontrolled diabetes, chronic pulmonary diseases.)

2. Neuromuscular disorder,
3. Bleeding disorders, patients on anticoagulant therapy,
4. Morbid obesity, psychiatric patients,
5. Infection at local site,
6. Uncooperative patients.

RESULTS

The study subjects were equally distributed between two groups. Each group received 31 subjects.

There is no statistically significant difference in distribution of demographic characteristics between Ropivacaine and Bupivacaine groups.

Table.1: Comparison Of Mean Sensory Block Duration Between Study Groups (N=62)

Group	Sensory Block Duration Mean ± STD	Mean difference	95% CI		P value
			Lower	Upper	
ROPIVACAINE	597.4 ± 190.2	78.06	-30.83	186.95	0.157
BUPIVACAINE	675.4 ± 235.9				

The mean Sensory block duration between the study groups was 597.4 ±

190.2 mins in subjects with Ropivacaine and 675.4 ± 235.9 mins in subjects with Bupivacaine.. The mean difference between the Groups is 78.06 (95% CI). It is statistically not significant (P Value 0.157).

Table.2: Comparison Of Mean Motor Block Duration Between Study Groups (N=62)

Group	Motor Block Duration Mean ± STD	Mean difference	95% CI		P value
			Lower	Upper	
ROPIVACAINE	548.0 ± 143.6	34.52	-38.33	107.36	0.35
BUPIVACAINE	582.5 ± 143.0				

The mean Motor block duration was 548.0 ± 143.6 mins in subjects with Ropivacaine and 582.5 ± 143.0 mins in subjects with Bupivacaine.. The mean difference between the Groups is 34.52 (95% CI). It is statistically not significant (P Value 0.35).

Table.3: Comparison Of Mean Duration Of Postoperative Analgesia Between Study Groups (N=62)

Group	Duration of Analgesia Mean ± STD	Mean difference	95% CI		P value
			Lower	Upper	
ROPIVACAINE	651.6 ± 136.4	10.52	-69.22	90.25	0.793
BUPIVACAINE	662.1 ± 175.0				

The mean duration of Postoperative Analgesia was 651.6 ± 136.4 mins with Ropivacaine and 582.5 ± 143.0 mins with Bupivacaine. The mean difference between the Groups is 10.52 (95% CI). It is statistically not significant (P Value 0.793).

Table 4: Comparision Of Mean Vas Score Between Study Groups

VAS SCORE AT DIFFERENT TIME	ROPIVACAINE Mean ± STD	BUPIVACAINE Mean ± STD
2 hrs	0.00 ± 0.00	0.00 ± 0.00
3 hrs	1.10 ± 0.70	1.10 ± 0.70
4 hrs	2.77 ± 0.85	2.74 ± 0.63
6 hrs	1.13 ± 1.99	1.13 ± 1.99
10 hrs	2.23 ± 1.33	1.48 ± 0.51
12 hrs	2.84 ± 0.97	2.74 ± 0.77
16 hrs	1.94 ± 1.89	1.90 ± 1.85
20 hrs	2.90 ± 1.35	2.74 ± 1.29
24 hrs	3.87 ± 1.15	3.84 ± 1.16

VAS score in Bupivacaine and Ropivacaine group over a period of 24 hours.

Haemodynamics (PR, SBP, DBP, MAP) were stable and within normal range in both Ropivacaine group and Bupivacaine group. There was no significant difference found in haemodynamics between the study groups.

DISCUSSION:

The mean duration of sensory block was 597.4 ± 190.2 mins in Ropivacaine group and 675.4 ± 235.9 mins in Bupivacaine group, the difference between groups was 78.06 (95%CI) which is statistically not significant.

The studies conducted by Stephen M Klein et al[5], Kooloth RA et al[6], Tripath D et al[7], concluded there was no statistically significant difference in the duration of sensory blockade between Ropivacaine and Bupivacaine group for brachial plexus block. The above studies are comparable with our study.

In contrast to present study Anupreeth Kaur et al[8], study shows significant long duration of sensory blockade in Bupivacaine compared to Ropivacaine group.

Duration of sensory block in the studies conducted by various authors.

In contrast to the present study Tripathi D et al[7], Anupreeth Kaur et al[8] studies observed earlier onset of motor block in Ropivacaine group compared Bupivacaine group.

The Duration of motor blockade was 548.0 ± 143.6 mins in Ropivacaine group and 582.5 ± 143.0 mins in Bupivacaine group. The mean difference between the groups is 34.52 (95% CI), which is not statistically significant. Comparable values were also noted in the studies conducted by Laura Bertini et al[9] 492 ± 162 mins, 666 ± 210 mins, Kooloth RA[6] 480 ± 55 mins, 507 ± 56 mins, Dua nupur et al[10] 548 ± 104 mins, 524 ± 133 mins, Tripathy D et al[7] 511 ± 61, 526 ± 45 mins, where there was no statistically significant difference in duration of motor block between the two groups. In Himat Vagadhia et al[11] study the duration of motor block was 780 mins to 840 mins in both R group and B group .

The duration of motor block in the study by Misiolek et al[12] 456 ± 186 mins, 570 ± 192 mins, Anupreeth Kaur et al[8] 365.60 ± 34.29 mins, 408.40 ± 50.39 mins in Ropivacaine and Bupivacaine groups respectively, had significant statistical difference between the Ropivacaine and Bupivacaine groups which was not comparable with our study.

The duration of postoperative analgesia in Ropivacaine group was 651.6 ± 136.4 mins and in Bupivacaine group was 662.1 ± 175.0 mins. The mean difference between the groups is 10.52 (CI 95%), which is statistically not significant (p value 0.793).

Similar observation was found in studies conducted by Kooloth RA et al[6] (688 ± 86.78 mins, 664.37 ± 102.97 mins), Nagia M Abd El Moeti et al[31] (432 ± 64.8 mins, 438 ± 96 mins), in Ropivacaine and Bupivacaine groups respectively , where there was no statistically significant difference in duration of analgesia.

There is no statistically significant difference in requirement of analgesic doses in 24 hrs of postoperative period. Maximum number of subjects in both Ropivacaine 61.29% and Bupivacaine 77.41% groups were required two doses of analgesics in 24 hrs of postoperative period.

CONCLUSION

The present study concluded that 30 ml of 0.75% Ropivacaine in supraclavicular brachial plexus block is a safe dose, allowing practitioner to produce a fast onset and long duration of peripheral nerve block with excellent postoperative analgesia and stable haemodynamics. In comparison to Bupivacaine, Ropivacaine provides similar onset and duration of sensory block, onset and duration of motor block and postoperative analgesia.

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