Original Research Article

A comparative study of 0.5% bupivacaine and 0.5% levobupivacaine in supraclavicular block in a tertiary care hospital

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Abstract

Background: supraclavicular brachial plexus block have assumed important role in modern anaesthesia practice as they provide ideal effective conditions without any general anaesthesia or adverse haemodynamic effects. While compared with bupivacaine, levobupivacaine is a newer, safer, longer acting local anaesthetic with rapid onset and prolonged duration of analgesia and similar or more pronounced nerve blocking effects, depending on the concentration. Hence the present study is aimed to compare the effectiveness of 0.5% levobupivacaine and 0.5% bupivacaine in supraclavicular brachial plexus block. **Materials and Methods:** In this prospective, randomized study, 2 groups of 25patients each were investigated, the cases were posted for elective upper limb orthopaedic surgeries were divided into group B-30 ml 0.5% bupivacaine/ group L-30 ml 0.5% levobupivacaine and the groups included both males and females. Study was done in Anaesthesia department of GEMSand Hospital, Srikakulam from Feb 2017 to July 2018. **Results:** Major differences in demographic data and physical status were not observed between both the groups in terms of age with 32.8 ± 12.1 and 33.5 ± 11.9, sex male and female ratio was 18/7 and 16/9, weight 62.8 ± 15.4 and 63.2 ± 14.6, height160 ± 10.7 and 161 ± 12.1 and ASA physical status were 19/6 and20/5 similar among the two groups of patients and the P-values were shown in the table 1. Duration of surgery was 33.8 and 36.8 minutes in group B and Group L correspondingly but there is no significant comparable difference between two groups (P=0.7351). On assessment of group B with group L, the difference in mean time for onset, peak and duration of sensory blockade and motor blockade were not significant P=0.7583. There are no statistical differences in latency, failure rate, and degree of the motor blockade, and failure of the sensorial blockade among two groups, but the latency of the sensorial blockade in all metameres analyzed showed statistically significant difference. Conclusion: Both levobupivacaine and bupivacaine are equally effective by means of sensory and motor blockade without possible damage.

Key Word: bupivacaine, Duration, Levobupivacaine, Anaesthesia, Supraclavicular block

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INTRODUCTION

Supraclavicular Brachial plexus block is a superb technique for attaining best possible operating conditions in case of prolonged orthopedic, plastic reconstructive surgeries and in emergency surgeries. Bupivacaine used generally for local blockade since of its extensive duration of action. But evidences of high risk of cardiac toxicity after bupivacaine use[1] systematic verification of the cardiac toxicity of bupivacaine stimulated tentative studies with its enantiomers, which shown minor cardio depressor activity of S(-) bupivacaine (levobupivacaine)[2]. A number of scientific studies on neuroaxis block contain that the effectiveness and the duration of the motor blockade of

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levobupivacaine are related to that of racemic bupivacaine, whereas others observed that the duration of its motor blockade is shorter than that of racemic bupivacaine[3]. Levobupivacaine is the last limited anesthetic introduced in medical practice. It is the S(-)-enantiomer of the local anesthetic bupivacaine. But both the R- and S-enantiomers of bupivacaine have anesthetic activity, preclinical studies recommended that levobupivacaine may be less cardiotoxicthan the racemic mixture[4]. Peripheral nerve block anaesthesia had several advantages more than general anaesthesia such as cost effective, positive postoperative recovery profile preserves CNS functions and prevents complications of intubation, laryngoscopy and muscle relaxants[5]. Numerous studies comparing ropivacaine with levobupivacaine and racemic bupivacaine for different nerve blocks showed that nerve blocks produced by ropivacaine have a clinical profile similar to that obtained with bupivacaine and levobupivacaine when used at similar concentrations and doses[5, 6]. Other studies, however, found prolongation of sensory analgesia with levobupivacaine compared to ropivacaine[6]. Furthermore, very less information is actually accessible in the present writing comparing the clinical use of levobupivacaine with bupivacaine for peripheral nerve block. We as a result conducted a prospective, randomized to compare the effectiveness of 0.5% levobupivacaine and 0.5% bupivacaine in supraclavicular brachial plexus block.

MATERIALS AND METHODS

After the study protocol had been approved by the Institutional review committee, informed consent to participate in the study was obtained from 50 cases posted for elective upper limb orthopaedic surgeries. Patients were randomized using sealed envelopes technique in 2 groups were divided into group B-30 ml 0.5% bupivacaine/ group L-30 ml 0.5% levobupivacaine and the groups included both males and females. Study was done in Anaesthesia department of GEMSand Hospital, Srikakulam from Feb 2017 to July 2018 with the inclusion criterias of Age under 18 to 50 years, Gender both male and female, Patients scheduled for elective upper limb orthopaedic surgery with ASA physical status I and II. And the exclusion criteria are Patients refusing consent, Contraindications to regional anaesthesia, previous nerve injury, any major systemic illness like diabetes mellitus, hypertension, IHD etc. Patients were randomly allocated to one of the two groups of 50 patients each by distributing sealed envelopes. Group B (n = 25) Patients received 30 ml of 0.5% bupivacaine Group L (n = 25) Patient received 30 ml of 0.5% levobupivacaine. Anthropometric data underwent descriptive analysis and, according to the parameter, the following tests were used: non-paired t test (age, weight, and height); Fisher's exact test (gender, physical status, and incidence of sensorial and motor blockade failures); Demographic data and onset of sensory and motor block and duration of analgesia were compared between the two groups. Statistical analysis of the data collected was done by chi square test and t-test using the computer online software www.epi.com. P values <0.05 was considered as statistically significant.

RESULTS

Major differences in demographic data and physical status were not observed between both the groups in terms of age with 32.8 ± 12.1 and 33.5 ± 11.9, sex male and female ratio was 18/7 and 16/9, weight 62.8 ± 15.4 and 63.2 ± 14.6, height160 ± 10.7 and 161 ± 12.1 and ASA physical status were 19/6 and20/5 similar among the two groups of patients and the P-values were shown in the table 1. Duration of surgery was 33.8 and 36.8 minutes in group B and Group L correspondingly but there is no significant comparable difference between two groups (P=0.7351). On assessment of group B with group L, the difference in mean time for onset, peak and duration of sensory blockade shown in table 3 and motor blockade shown in table2 were not significant (P=0.7583) shown in table4. The interval of effective analgesia was similar in both the groups (P>0.05). There were no considerable variation in the time of first rescue analgesic requirement after 12th, 16th and 20th hour in group B and group L. The analgesic necessities of both the groups were alike. There was no considerable difference in total dose of rescue analgesics necessary in group L as compared to group B.

Table 1: Demographic Data and Descriptive Level

Parameters	Group B	Group L	P Value
Age (years)	32.8 ± 12.1	33.5 ± 11.9	0.5021
Weight (kg)	62.8 ± 15.4	63.2 ± 14.6	0.8522
Gender (M/F)	18/7	16/9	0.5263
Height (cm)	160 ± 10.7	161 ± 12.1	0.6481
Physical status ASA (I/II)	19/6	20/5	0.6265

Table 2: Latency of the Motor Blockade (min) and Failure

	Latency of the motor blockade (min) Median (25 – 75 percentile)			Failure %		
	Group B	Group L	P Value	Group B	Group L	P Value
Radial Wrist extension	12.0(8.0– 16.0)	10.0 (6.0 – 14.0)	0.328	25.1%	10.3%	0.238
Radial Wrist abduction	14.0 (7.9 – 20.1)	11.0 (7.0 – 15.0)	0.061	29.5%	19.6%	0.390
Median Flexion of the wrist	11.0 (6.0 – 14.0	7 (2.0 – 15.3)	0.318	12%	16.8%	0.70
Median Pronation of the forearm	12.0 (9.5 – 19.8)	14.0 (7 – 21.0)	0.784	43.6%	25.9%	0.305
Axillary Rotation of the humerus	12.0 (8.6 – 16.1)	13.5 (6.0 – 20.0)	0.925	29.9%	18.7%	0.500
Axillary Abduction of the humerus	11.0 (7.0 – 15.5)	10.0 (6.5 – 16.5)	0.745	34.8%	35.9%	0.990
Ulnar Flexion of the 5th finger	7.0(5.0 – 9.1)	10.0 (5.0 – 10.0)	0.831	22.1%	32.0%	0.501
Ulnar Adduction of the thumb	14.0 (7.5 – 20.0)	12.0 (5.0 – 15.0)	0.0750	25.9%	14.1%	0.418

Table 3: Latency of the Sensorial Blockade (min) and Failure Rate

	Latency of the Sensorial blockade (min) Median (25 – 75 percentile)			Failure %		
	Group B	Group L	P Value	Group B	Group L	P Value
C5	11.0 (5.5 – 14.5)	6.0 (4.0 – 8.0)	0.050	12.0%	13.0%	0.998
C6	9.0 (5.0 – 14.0)	5.5 (1.0 – 8.5)	0.005	8.0%	8.0%	0.919
C7	9.5 (5.0 – 14.0)	6.0 (1.0 – 9.0)	0.01	9.0%	13.0%	0.989
C8	10 (6.0 – 14.0)	5.0 (4.0 – 10.0)	0.050	12.0%	13.0%	1.000

Table 4: Assessment of the Degree of the Motor Blockade

Parameters	Group B	Group L
Without paralysis	1 (4.0%)	1 (4.0%)
Difficulty raising the arm and hand weakness	4 (16.0%)	5 (20.0%)
Unable to raise the arm	20 (80.0%)	19 (76.0%)

P*=0.7583

DISCUSSION

This study confirmed that there were no considerable variation between bupivacaine and levobupivacaine. Patients' satisfaction, safety, growing demand for cost effective anaesthesia and a favorable postoperative recovery profile have resulted in increased demand for regional techniques. Some studies state that bupivacaine plays a vital responsibility in the cardiotoxicity[7]. This indirect cardiotoxicity is moreover enantiomer selective with R(+)-bupivacaine having a superior depressant results on the cell firing rate of the nucleus tractus solitarius and consequently the cardiovascular and respiratory centres of the brain[7]. So, R (+)-bupivacaine appears to be the most important cause in the toxicity produced by RS-bupivacaine by its outcome on the CNS and cardiac sodium and potassium channels[8]. Along with different types of brachial plexus block the supraclavicular progress has been measured the most successful with bupivacaine. It is often described as "spinal anaesthesia for upper extremity" since of its all over application for upper extremity surgery typically related with a rapid onset of anaesthesia, high success rate, complete and predictable anaesthesia for upper extremity. Bupivacaine is usually used local anaesthetic drug for brachial plexus block since of its long duration of action and a positive ratio of sensory to motor neural block. However, its toxicity is a concerning issue especially when larger doses are used in peripheral nerve blocks or prolonged infusions for postoperative analgesia. Few studies have compared the clinical profile of levobupivacaine and ropivacaine for brachial plexus block or femoral nerve block. current studies exposed a significantly similar clinical profile when same volumes of levobupivacaine 0.5% and ropivacaine 0.5% were compared for use in mutual psoas compartment-sciatic nerve block in patients undergoing total hip arthroplasty. In this study, levobupivacaine

showed significantly longer duration of analgesia (13.16 ± 1.40 h) when compared with ropivacaine (10.01 ± 1.6 h; P < 0.05). Casati *et al* stated that there is no dissimilarity in onset time, quality of intraoperative anaesthesia, effectiveness of postoperative analgesia and recovery of motor function[10] Whereas our study also shown no significant difference in VAS score and, hence, the time for rescue analgesia in both the groups. And also No major intra operative and postoperative complications such as pneumothorax, intra-arterial or intravascular placement of drug, nausea, vomiting, neurotoxicity, or cardiotoxicity were found in both the group. A study reported that the ropivacaine group showed somewhat elevated verbal statistical rating scale scores at 8th and 10th hour postoperatively[11]. While our study do not have any such difference after post surgery.

CONCLUSION

Bupivacaine is used widely because of its long duration of action, differential block and, in obstetric use, lack of adverse neonatal neuro behavioural effects. Our study showed that peripheral nerve blocks with levobupivacaine 0.5% and bupivacaine 0.5% provide comparable postoperative analgesia for patients undergoing upper limb surgeries. To conclude, both levobupivacaine and bupivacaine are equally effective by means of sensory and motor blockade without possible damage.

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