Original Research Article

A study on comparison between 0.5% levobupivacaine and 0.5% ropivacaine in supraclavicular brachial plexus blockade - A randomized clinical trial

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Abstract

Aim: A prospective randomized, double-blind study was undertaken to compare the onset and duration of sensory and motor blocking properties of 0.5% Levobupivacaine and of 0.5% Ropivacaine in supraclavicular brachial plexus block for elective upper limb orthopaedic surgeries. **Methodology:** After informed consent, 60 ASA class I and II patients of age 18-65yrs posted for elective upper limb orthopaedic surgeries were randomly allocated into two groups so that each group consists of 30 patients from the Department of Anaesthesiology and critical care, at Kurnool Medical College, Kurnool from August 2018 – July 2019. The study was undertaken after obtaining ethical committee clearance.GROUP A-(L) received 0.5%Levobupivacaine(29ml) with 1ml normal saline.GROUP- B(R) received 29ml of Inj. Ropivacaine hydrochloride0.5%. with 1ml normal saline.**Results:** Patients who had contraindication for brachial plexus block, hypersensitivity or contraindication to study drugs, patients with severe renal, hepatic, respiratory, cardiac disease, neurological, psychiatric or neurological disorders, were excluded from the study. Under aseptic precautions, supraclavicular brachial plexus block was done employing nerve stimulator. The onset of the sensory blockade and motor the blockade, quality of motor blockade, duration of sensory and motor blockade, adverse events and hemodynamic parameters were studied. In two groups, there was no statistically significant difference in the onset of sensory and motor block. When compared in two groups duration of analgesia and duration of motor block was greater in Levobupivacaine group which was statistically significant.

Duration of sensory block and duration of motor block was less in Ropivacaine group. There were no adverse events or hemodynamic instability which were statistically significant in two groups. **Conclusion:** we conclude that 30 ml 0.5% Levobupivacaine for supraclavicular brachial plexus block produces a longer duration of sensory and motor blockade than ropivacaine.

Keywords: Levobupivacaine, Ropivacaine, Blood Pressure, Hemodynamic, supraclavicular brachial plexus block

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Introduction

Over decades anaesthesia has evolved into a speciality subject with a lot of improvements in the drugs and the methods employed to provide anaesthesia with the least complications. With the introduction of newer local anaesthetics and better advantages of regional anaesthesia, it is taken as the principle technique for upper limbsurgeries. Despite the advances in knowledge of pathophysiology of pain, pharmacology of analgesics and development of effective techniques for postoperative control, many patients continue to experience considerable discomfort[1,2].For upper limb surgeries anaesthesia and postoperative analgesia can be provided by brachial plexus blockade. Brachial plexus blockade through supraclavicular approach provides anaesthesia for surgeries over elbow, forearm, and hand. Advantages of supraclavicular approach are tourniquet pain is well tolerated, landmarks can be easily identified, rapid onset and high success rate.

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Because of higher potency and longer duration of action Bupivacaine 0.5% is most commonly used in brachial plexus blockade. But due to cardio-toxicity it causes life threatening arrhythmias which are resistant to most of the anti-arrythmics used, when accidentally injected into subclavian artery. Levobupivacaine has all advantages of bupivacaine without cardiotoxicity. Therefore it is taken for study.

Ropivacaine[3] a new amino amide local anaesthetic has advantages of bupivacaine without cardiotoxicity. Many studies are not done on ropivacaine.

Aim and objectives of study

- Aim of study is to compare 0.5% Levobupivacaine and 0.5% Ropivacaine forsupraclavicular brachial plexus block in terms of

1. Onset, duration, quality of intraoperative analgesia
2. Onset and duration of sensory block
3. Onset and duration of motor block

Patients and methods methodology

In the present study entitled "comparison between 0.5% levobupivacaine and 0.5% ropivacaine in supraclavicular brachial plexus blockade -A randomized clinical trial" was carried out in 60 patients of either sex undergoing supraclavicular brachial plexus block, using local anaesthetic agents with injection Levobupivacaine 0.5% and Ropivacaine 0.5% in the Department of Anaesthesiology and critical care, at Kurnool Medical College, Kurnool from August 2018 – July 2019. The study was undertaken after obtaining ethical committee clearance.

Groups

All the patients were randomly allocated into two groups so that each groupconsists of 30 patients.

Group-A (L):0.5%Levobupivacaine (29ml) with 1ml normal saline.

Group- B(R) :29ml of Inj. Ropivacaine hydrochloride 0.5% with 1ml normal saline.

Inclusion criteria

- Patients undergoing orthopaedic upper limb surgeries in the age group of 18 - 65 years of both sexes will be included with ASA grade I and grade II.
- Patients with valid consent.

Exclusion criteria

- ASA Grade-Ill and IV of high-risk group patient.
- Bleeding disorders

Block assessment

The quality of the nerve blockade was evaluated prior to surgical incision, by assessment being performed at 5-minute intervals up to 30 minutes after completing thelast injection.

Simultaneously, for comparison purposes sensory and motor functions in the contralateral limb were used. Testing of the sensory block was done in the deltoid area because it considered the most relevant to the surgical model is used. Sensory function was assessed by pinprick and scored present or absent.

Similarly, motor function was assessed by testing for abduction of the arm and flexion of the arm.

A modified Bromage scale was used:

A score of 4: Full power;

A score of 3: Reduced power but able to lift the arm against resistance.

A score of 2: moves relevant muscle group against gravity but unable to lift them against resistance.

A score of 1: perceptible muscle contraction, but unable to lift the arm

A score of 0: no movement in the relevant muscle group.

Duration of the sensory blockade was assessed by asking the patient to record the time of onset first pain sensation. Sensory block was assessed by pinprick method.

Grade	0	=	Sharp pain
	1	=	Dull sensation (Analgesia)
	2	=	No sensation (Anaesthesia)

Duration of sensory block was evaluated by using VAS score (VAS scale: 0 cm=no pain, 10 cm=worst pain) in the patients. Duration of sensory block (analgesic duration) was deemed from the time of administration of nerve block till a VAS score of ≥4 was noted in our study patients postoperatively excluding failed block. Rescue analgesiawas administered when a VAS score of ≥4 cm was recorded. Assessments were terminated when anaesthesia in the deltoid region was deemed complete or after 30 minutes elapsed or whichever came first.

A successful block of brachial plexus was defined as the presence of adequate motor block (motor score <2); absent sensations to cold and pinprick sensation within 30 minutes of injection, and absence of need of general anaesthesiaThe failed block is defined as "absence of surgical anaesthesia even at 30 minutes in at least one of the tests or needs to convert to general anaesthesia for completion of surgery."

Duration of sensory blockade: It is the time from the onset of sensory blockade toonset of pain at the surgical site. [duration of analgesia].

Duration of motor blockade: It is the time from the onset of the motor blockade to the complete recovery of abduction at shoulder joint against gravity

Overall quality of block on a three-point scale: 0 = complete failure, 1 = Insufficient block (inadequate analgesia, inadequate relaxation, or patient requiring general anaesthesia because of agitation and restlessness), 2 = satisfactory block.

Monitoring

Both the patient and investigator making observation were unaware of drugs administered.

Motor and the Sensory blockade were evaluated at 5,10,15,20 and 25 minutes after giving the drug. All vital data like Pulse Rate, BP, Spo2, ECG were monitored. All patients were observed for complications like nausea, vomiting, pruritus, hematoma, pneumothorax, and Horner's syndrome.

VAS is a 10 cm long slide ruler with "no pain" written at one end and "Maximum Pain" at the other. The patient slides the cursor along the ruler until itreaches the level that represents the intensity of his pain. The other side of the ruler is graduated over 100 mm and gives the investigator a numerical measure of the pain. The patients were also monitored for any side effects or complications.

The data thus obtained was compiled and analyzed using the Statistical Package for Social Services. (SPSS vs 21).The relation between categorical variables was analyzed using chi-square and Fischer exact test. The relation between nominal data was analyzed using student t-test and analysis of variance (ANOVA) test. The probability of less than 0.05 was taken as significant at 95% confidence interval.

Results

The following are the observations and results from the study done in two groups.

Demographic data

AGE

Mean age of the study subjects in group A was 35.33±5.653, group B was 32.63 ±5.928 years. The participants were allocated into two groups, such that there won't beany age wise difference between the groups. (p>0.05)

Table 1: Age wise distribution of the study participants

GROUP		N	Mean	Std. Deviation	t-value	P Value
AGE	Levobupivacaine	30	35.33	5.653	-1.508	0.137(Not Sig.)
	Ropivacaine	30	32.63	5.928		
	Total	60	33.98	5.902		

Sex: Out of 30 patients in group A, 19 (63.3%) were males, and 11(36.7%) were females. Similarly, in group B, 21 (70%) were males, and 9 (30%) were females. The participants were allocated into two groups, such that there wasn't gender wise difference between the groups. (X^2 = 0.3; p>0.05)

Table 2: Gender wise distribution of the study participants

		Sex			
		Male		Female	Total
GROUP	Levobupivacaine	Count	19	11	30
		% within GROUP	63.3%	36.7%	100.0%

		% within Sex	47.5%	55.0%	50.0%
	Ropivacaine	Count	21	9	30
		% within GROUP	70.0%	30.0%	100.0%
		% within Sex	52.5%	45.0%	50.0%
Total		Count	40	20	60
		% within GROUP	66.7%	33.3%	100.0%
		% within Sex	100.0%	100.0%	100.0%

Height

Mean height of the study subjects in group A was 159.27 ± 5.889 centimetres, group B was 159.23 ± 5.276 centimetres. The participants were allocated into groups, such that there won't be any difference between the groups with respect tomean height. (p>0.05)

Table 3: Distribution of the study participants by mean height (in centimetres)

GROUP		N	Mean	Std. Deviation	t-value	P Value
	Levobupivacaine	30	159.27	5.889		
	Ropivacaine	30	159.23	5.276		0.982
HT	Total	60	159.25	5.544	0.023	(Not Sig.)

Weight

Mean weight of the study subjects in group A was 58.43 ± 6.185 kilograms, group B was 58.03 ± 6.037 kilograms. The participants were allocated into groups, such that there won't be any difference between the groups with respect to mean weight. (p>0.05)

Table 4: Distribution of the study participants by mean weight (in kilograms)

GROUP		N	Mean	Std. Deviation	t-value	P Value
	Levobupivacaine	30	58.43	6.185		
	Ropivacaine	30	58.03	6.037		0.801
WT	Total	60	58.23	6.063	0.253	(Not Sig.)

Onset of sensory block

Meantime of onset of a sensory block of the study subjects in group A was 8.12 ± 0.91 minutes, group B was 8.53 ± 1.09 minutes. On comparison of the mean time of onset of sensory block with unpaired t-test, there was no significant differencebetween two groups.(P>0.05)

Table 5: Distribution of the participants by Time of onset of the sensory block

GROUP		N	Mean	Std. Deviation	t-value	P Value
Time of onset of sensory block (Min)	Levobupivacaine	30	8.12	0.91	-1.596	0.116 (Not Sig.)
	Ropivacaine	30	8.53	1.09		
	Total	60	8.32	1.02		

Onset of motor block

Meantime of onset of motor block of the study subjects in group A was 12.95 ±1.74 minutes, group B was 13.65 ± 1.34 minutes. On comparison of the mean time of motor block with unpaired t-test, there was no significant difference between two groups. (p>0.05).

Table 6: Distribution of participants by Time for the onset of motor block (min)

GROUP		N	Mean	Std. Deviation	t-value	P Value
Time of onset of motor block (Min)	Levobupivacaine	30	12.95	1.74	-1.749	0.086 (Not Sig.)
	Ropivacaine	30	13.65	1.34		
	Total	60	13.30	1.58		

Mean duration of sensory block(duration of analgesia)

Mean duration of the sensory block of the study subjects in group A was 12.31 ± 2.22 hours, group B was 9.83 ± 2.90 hours..

On comparison of mean duration of sensory block with unpaired t-test, there wasa significant difference between the groups. (p<0.05)

Table 7: Distribution of participants by mean duration of sensoryblock(hrs)(duration of analgesia)

GROUP		N	Mean	Std. Deviation	t-value	P Value
Duration of sensory block (Hours)	Levobupivacaine	30	12.31	2.22	3.717	<0.0001(VHS)
	Ropivacaine	30	9.83	2.90		
	Total	60	11.07	2.85		

Table 8: VAS scoring and rescue analgesia

a. overall change with time

Group	Levobupivacaine				Ropivacaine				
VAS	**0-3**	**3-5**	**5-8**	**8-10**	**0-3**	**3-5**	**5-8**	**8-10**	**P Value**
7 hrs	28	2	0	0	11	6	13	0	<0.0001*
8 hrs	26	2	2	0	6	8	11	5	<0.0001*
9 hrs	21	5	4	0	4	5	12	9	<0.0001*
10hrs	14	8	6	2	2	2	11	15	<0.0001*

11hrs	7	8	10	5	0	2	8	20	<0.0001*
12hrs	2	8	12	8	-	-	-	-	-
13hrs	1	3	12	14	-	-	-	-	-

In group A, the majority of the patients needed rescue analgesic around 10hrs.
In group B, the majority of the patients needed rescue analgesic around 6 hrs.
On comparing group A and B, a number of patients needed rescue analgesia in group A is less than group B at 6hrs,7 hrs, 8 hrs, and 9 hrs, 10 hrs and 11 hrs, which was significant. (p<0.05).

Mean duration of motor block

Mean duration of the motor block of the study subjects in group A was 8.91 ± 2.59 hours, group B was 6.26 ± 1.66 hours.
On comparison of mean duration of motor block with unpaired t-test, there was a significant difference between the two groups. (p<0.05)

Table 9: Distribution of participants by mean duration of motor block (hours)

GROUP		N	Mean	Std. Deviation	t-value	P Value
Duration of motorblock (Hours)	Levobupivacaine	30	8.91	2.59	4.730	<0.0001 (VHS)
	Ropivacaine	30	6.26	1.66		
	Total	60	7.58	2.53		

Hemodynamic parameters pulse rate

In two groups mean pulse rate changes equally with time. At any point in time,the difference between the groups was not significant statistically. (p>0.05)

Table 10: Distribution of participants by changes in pulse rate

	Pulse Rate changes (Mean ± SD)		
Time	**Levobupivacaine**	**Ropivacaine**	**P value**
Pre-operative	86.87 ± 3.95	88.9 ± 5.93	**0.123**
0 min	86.27 ± 6.45	88.07 ± 4.57	**0.217**
15 min	85.63 ± 4.49	87.73 ± 6.07	**0.133**
30 min	81.67 ± 5.71	83.8 ± 4.79	**0.122**
45 min	79.33 ± 4.56	81.07 ± 8.22	**0.317**
60 min	75.83 ± 4.62	77.83 ± 6.04	**0.155**
75 min	86.37 ± 11.96	88.13 ± 5.95	**0.472**
90 min	89.13 ± 9.13	91.67 ± 6.8	**0.228**
105 min	93.6 ± 7.26	94.93 ± 8.54	**0.517**
120 min	97.17 ± 6.61	99.87 ± 5.93	**0.101**
Post-op	98.8 ± 4.98	101.67 ± 7.33	**0.082**

Blood pressure

In the two groups mean systolic blood pressure changes equally with time. At any point in time, the difference between the groups was not significant statistically. (p>0.05)

Table 11: Distribution of groups by changes in Systolic blood pressure (SBP)

	SBP changes (Mean ± SD)		
Time	**Levobupivacaine**	**Ropivacaine**	**P value**
Pre-operative	121.87 ± 7.61	120.03 ± 7.97	**0.366**
0 min	112.97 ± 11.82	110.97 ± 10.33	**0.488**
15 min	110.17 ± 11.7	107.93 ± 9.8	**0.426**
30 min	103.33 ± 13.98	101.47 ± 11.76	**0.578**
45 min	98.33 ± 9.08	96.6 ± 5.64	**0.378**
60 min	94.57 ± 8.7	92.33 ± 8.83	**0.328**
75 min	96.47 ± 5.86	95.63 ± 9.57	**0.686**
90 min	102.03 ± 15.29	99.87 ± 13.88	**0.568**
105 min	111.53 ± 16.61	109.53 ± 11.71	**0.592**
120 min	113.47 ± 11.95	111.27 ± 12.65	**0.492**
Post-op	117.1 ± 9.9	115.03 ± 10.25	**0.430**

In the two groups mean diastolic blood pressure changes equally with time. At any point in time, the difference between the groups was not significant statistically.(p>0.05)

Table 12: Distribution of groups by changes in Diastolic blood pressure (DBP)

	DBP changes (Mean ± SD)		
Time	**Levobupivacaine**	**Ropivacaine**	**P value**
Pre-operative	**84.5 ± 8.06**	**83.2 ± 7.26**	**0.514**
0 min	**75.83 ± 7.9**	**77.57 ± 7.65**	**0.392**
15 min	**75.17 ± 7.38**	**75.8 ± 7.18**	**0.738**
30 min	**69.53 ± 6.38**	**70.33 ± 8.41**	**0.680**
45 min	**64.63 ± 8.26**	**65.03 ± 7.16**	**0.842**
60 min	**63.13 ± 8.13**	**64.27 ± 9.08**	**0.612**

75 min	63.47 ± 5.41	62.5 ± 6.63	0.539
90 min	68.8 ± 7.86	70.63 ± 8.28	0.383
+-105 min	73.8 ± 5.4	75.1 ± 7.74	0.454
120 min	75.97 ± 9.98	76.73 ± 6.15	0.722
Post-op	78.27 ± 8.1	78.1 ± 9.74	0.943

In the two groups mean arterial pressure changes equally with time. At any point in time, the difference between the groups was not significant statistically. (p>0.05)

Table 13: Distribution of groups by changes in Mean arterial pressure (MAP)

	MAP changes (Mean ± SD)		
Time	Levobupivacaine	Ropivacaine	P value
Pre-operative	96.23 ± 6.08	95.6 ± 9.11	0.753
0 min	88.4 ± 10.47	87.13 ± 8.47	0.609
15 min	86.67 ± 14.01	85.4 ± 8.73	0.676
30 min	80.2 ± 10.07	80.73 ± 6.69	0.810
45 min	76.53 ± 7.38	76.2 ± 6.68	0.855
60 min	73.13 ± 6.62	72.8 ± 7.85	0.859
75 min	73.8 ± 5.52	73.33 ± 5.97	0.754
90 min	80.83 ± 5.33	79.83 ± 6.19	0.505
105 min	86.37 ± 6.76	85.87 ± 5.58	0.756
120 min	88.8 ± 7.08	87.7 ± 8.99	0.601
Post-op	90.93 ± 6.58	89.1 ± 8.94	0.369

Oxygen saturation:In the two groups mean oxygen saturation changes equally with time. At anypoint in time, the difference between the groups was not significant statistically.

Table 14: Distribution of participants by mean oxygen saturation (SpO2)

	SPO2 changes (Mean ± SD)		
Time	Levobupivacaine	Ropivacaine	P value
Pre-operative	97.57 ± 0.82	97.93 ± 1.2	0.172
0 min	97.63 ± 0.96	97.77 ± 0.94	0.589
15 min	97.77 ± 0.9	97.8 ± 1.06	0.896
30 min	97.53 ± 0.97	97.6 ± 1.28	0.821
45 min	97.53 ± 0.97	97.77 ± 1.04	0.373
60 min	97.1 ± 2.04	97.87 ± 0.94	0.066
75 min	97.47 ± 1.14	97.7 ± 4.46	0.782
90 min	97.5 ± 1.31	97.8 ± 1	0.321
105 min	97.7 ± 0.6	97.6 ± 1.22	0.688
120 min	97.37 ± 1.22	97.67 ± 0.92	0.286
Post-op	97.8 ± 1.49	97.73 ± 1.91	0.881

Complications: Nausea was seen in two patients in group A and 4 patients in group B. Vomiting was seen in three patients in group A, and three patients in group B. Pruritus was seen in one patient in group A and one patient in group B. Insufficient block was seen in one patient in group A and one patient in group B.

Table 15: Distribution of groups by complications observed

Complications	Levobupivacaine	Ropivacaine
Nausea	2 (6.67%)	4 (13.33%)
Vomiting	3 (10.0%)	3 (10.0%)
Pruritus	1 (3.33%)	1 (3.33%)
Insufficient block	1 (3.33%)	1 (3.33%)

Discussion

Brachial plexus block has emerged as a popular technique among the anaesthetists for upper limb surgeries. This type of anaesthesia avoids the untoward effects of the general anaesthesia. Advantages of brachial plexus block are:

a) Patients are usually awake and communicating during brachial plexus block.
b) decreased incidence of postoperative nausea and vomiting.
c) Is effective in terms of cost and performance.
d) There is an increased margin of safety.
e) Also provides good postoperative analgesia.

Many approaches of brachial plexus block were also described, andthe available literature has shown that supraclavicular block is the superior and easiest method for anaesthesia and postoperative pain management and most consistent method for anaesthesia in surgeries below the shoulder joint. Compared to other approaches for brachial plexus block like interscalene, axillary approaches, supraclavicular approach is quick to perform, relatively more success rate and has less incidence of diaphragmatic hemiparesis

Several drugs have been tried as local anaesthetics for brachial plexus block. Levobupivacaine, the isolated (s) isomer of bupivacaine and ropivacaine, an amide local anaesthetic is the latest local anaesthetics and has been shown to be less cardiotoxic than bupivacaine.

Ropivacaine is relatively less lipid soluble which makes it less cardiotoxic and neurotoxic. Bupivacaine has same efficacy for the time to reach sensory block but total dration of sensory and motor block is more in levobupivacaine and ropivacaine than bupivacaine, and they have better toxicity profile than bupivacaine. The study done by Barsagade et al[4] comparing levobupivacaine, bupivacaine and ropivacaine in supraclavicular brachial plexus block, levobupivacaine had longer duration of sensory and motor block compared to other two drugs. The study done by Shailendra Modak et al[5] comparing 0.5%bupivacaine and 0.5% ropivacaine in brachial plexus block by supraclavicular approach for upper limb

surgeries concluded that ropivacaine has faster onset of sensory and motor block, longer duration of analgesia and less toxicity compared with same concentration of bupivacaine.Therefore levobupivacaine and ropivacaine are compared in this study. The dose selection in this study was based on the historical evidence of optimally useddrugs which are safe to use.

The present study to compare 0.5% levobupivacaine and 0.5% ropivacaine for supraclavicular brachial plexus block using nerve stimulator was undertaken at Government general hospital, Kurnool. The aim of the study was to compare the onset and duration of sensory and motor block of 0.5% levobupivacaine and 0.5% ropivacaine in our study

Demographic data

In the present study, two groups A, B were comparable with regards to the demographic variables and were statistically not significant.

Mean onset of sensory block

In our study mean onset of sensory block for ropivacaine was 8.5 min and mean onset of sensory block for levobupivacaine was 8.1 min. Mean onset of sensory block for ropivacaine is similar to study done by Anuja A Rathore et al[6] a comparative double blinded study of levobupivacaine and ropivacaine in ultrasound guided supraclavicular brachial plexus block

On comparison of groups , we observed that there was no statistical difference in mean onset of sensory block in our present study. Study done by Casati et al[7] on comparing levobupivacaine and ropivacaine in interscalene brachial plexus block for open shoulder surgeries, there was no statistical difference in mean onset of sensory block between the two drugs which is similar to our present study

Mean onset of motor block

In our study mean onset of the motor block for levobupivacaine was 12.9 min andmean onset of the motor block for Ropivacaine was 13.6 min.

On comparison also there was no statistical difference in mean onset of motor block in our study. In studies done by Khushboo Malav et al[8] on comparing 0.5% ropivacaine and 0.5% levobupivacaine in sciatic nerve block for foot and ankle surgeries, the difference in mean onset of motor block for both the drugs was not statistically significant.

In study done by Kirti et al[9] a comparative study between 0.5% bupivacaine and 0.5% ropivacaine in supraclavicular brachial plexus block, similar trend of results was observed in which there is no statistical significance in difference for mean onset of motor block between the drugs

Mean duration of sensory block(duration of analgesia)

In our study mean duration of Analgesia for levobupivacaine was 12.3 hrs and mean duration of Analgesia for ropivacaine was 9.8hrs.Duration of analgesia was longer for levobupivacaine group compared to ropivacaine group, which was statistically significant.

In these studies duration of sensory block (duration of analgesia) was prolonged for levobupiavacaine when compared to ropivacaine which was statistically significant. It is in correlation with our present study.

For comparing 0.33% levobupivacaine and 0.5% ropivacaine in axillary brachial plexus block, duration of sensory block was significantly extended in levobupivacaine group compared to ropivacaine. This is in correlation with our present study.

In meta analysis done by Ang li et al[10] on comparing levobupivacaine and ropivacaine in peripheral nerve blocks, longer duration of sensory block existed in levobupivacaine group compared to ropivacaine.

Duration of block was bound up with protein bound level and more protein bound drugs could lead a longer duration of effect. Levobupivacaine is more protein bound compared to ropivacaine. This might be reason for longer duration of action of levobupivacaine. Ropivacaine is ten times less lipophilic than levobupivacaine and is resistant to rapidly penetrating the myelinated nerve fibres. Therefore diffusion of ropivacaine within soft tissues and fat is hindered. Perineural and epineural fat influences the regional anaesthesia leading to diminished degree of anaesthesia intensity.

VAS score

The duration of effective analgesia was calculated from the time between the end of local anaesthetic administration to the time when VAS was less than 4, and rescue analgesic was administered when VAS score was equal to or greater than 4. Injection Diclofenac IM was given as rescue analgesia.

In our study most patients in group ropivacaine attained a VAS score of 4 at 7 hours and most patients in group levobupivacaine attained a VAS score of 4 at 11 hours.

More rescue analgesics were needed in the ropivacaine group than levobupivacaine group, and it was statistically significant in our study. It is due to prolonged sensory block of levobupivacaine compared to ropivacaine.

The vasoconstrictor property of aminoamide local anaesthetic, vascularity of the injection site, lipid solubility , and addition of epinephrine may contribute to decreased absorption of local anaesthetic into systemic circulation. This leads to prolonged nerve exposure to local anaesthetic and reduced plasma levels, which lead to an increased duration of anaesthesia produced by the local anaesthtic agent.

Double blinded study of levobupivacaine and ropivacaine in ultrasound guided supraclavicular brachial plexus block duration of post operative analgesia was more in levobupivacaine group compared to ropivacaine. This difference was statistically significant. This is in correlation with our present study. In study conducted by Mageswaran et al[11] on comparison of 0.5% ropivacaine and 0.5% levobupivacaine for infraclavicular brachial plexus block no such difference in post operative analgesia after 6 hours in both groups was noted.

Mean duration of motor block

In our study mean duration of the motor block for Ropivacaine was 6.2 hrs and the mean duration of the motor block for levobupivacaine was 8.9hrs.Ropivacaine is less lipophilic. Therefore, it has a selective action on pain- transmitting Aδ and C nerves fibres rather than Aβ fibres (large myelinated fibre) which are involved in motor functions, this might be the reason for faster recovery of motor functions with ropivacaine in our study .

On comparisons, duration of the motor block for levobupivacaine was greater, and the duration of motor block was least in Ropivacaine group. The difference in mean duration of motor block was statistically significant. The study conducted by Piangtelli et al[11] to compare levobupivacaine and ropivacaine in infrac-lavicular brachial plexus block, duration of motor block was more for levobupivacaine than ropivacaine which was statistically significant. This correlates with our present study. In study done by Khushboo Malav et al. on comparison of 0.5% ropivacaine and 0.5% levobupivacaine for sciatic nerve block using Labat approach in foot and ankle surgery observed that duration of motor block was prolonged in patients receiving levobupivacaine compared to patients receiving ropivacaine. This is similar to observation in our present study.Cline et al[12] conducted a study on analgesia and effectiveness of levobupivacaine compared with ropivacaine in patients undergoing an axillary brachial plexus block. In this study duration of motor block was shorter with ropivacaine when compared with levobupivacaine which was significant statistically. This is in correlation with our present study.

Hemodynamic changes

Pulse rate

Changes in pulse rate were similar in both the groups, and no statistically significant difference was found. There were no serious side effects in any of the patients in two groups

Blood pressure

In the present study, the statistically significant difference was not

found in both systolic and diastolic blood pressure.

Oxygen saturation

The mean oxygen saturation also not varied much in both the groups and no patient required any intervention. Kulkarni et al conducted a study by comparing 0.5%levobupivacaine and 0.5% ropivacaine for supraclavicular brachial plexus block found no statistically significant difference in oxygen saturation, which is similar to our present study.

There was one patient with partial blocks in the ropivacaine group and one patient with partial blocks in Levobupivacaine group in whom a few dermatomal sparing was also present.

We have used nerve stimulator for the method of identification to give the block. The patients with insufficient block were given supplementation with Injection Ketamine hydrochloride in the groups to complete the surgery. There were no complete failures of the block in two groups.

Complications

The complications that were seen in our study were nausea, Vomiting, and Pruritus. These were not statistically significant. Similar side effects were seen in a study conducted by Soma Cham et al on comparison of the effects of fentanyl and dexmedetomidine in supraclavicular brachial plexus block achieved with ropivacaine. No signs of the central nervous system and cardiovascular toxicity were reported in any patients.

Conclusion

The following can be concluded from the present study.

- Duration of analgesia was longer in Levobupivacaine group.
- Duration of motor block was longer in Levobupivacaine group.
- Ropivacaine 0.5% and Levobupivacaine 0.5% produce similar onset of motor and sensory blockade.

Hence we conclude that 30 ml 0.5% Levobupivacaine for supraclavicular brachial plexus block produces a longer duration of sensory and motor blockade than ropivacaine.

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