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ORIGINAL RESEARCH

A Comparative Study of Subarachnoid Block Characteristics Using Isobaric Solution of Levobupivacaine and Ropivacaine in Elective Infraumbilical Surgeries

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Abstract
Background: This study was conducted to compare (0.5%) levobupivacaine (17.5 mg) and (0.5%) ropivacaine (17.5mg) for the patients undergoing infraumbilical surgery under spinal anaesthesia, with regard to efficacy, effectiveness in terms of time to reach T10, peak block height, time to reach the peak block, duration of sensory block at T10 and two segment regression time, and pre- and post-interventional hemodynamic profiles.
Methods: This was a hospital-based prospective randomized study conducted among 90 patients undergoing infraumbilical surgery under spinal anaesthesia at the Department ofSurgery, S.C.B. Medical College and Hospital, from December 2020 to November 2022 after obtaining clearance from the institutional ethics committee and written informed consent from the study participants.
Results: Comparison of effectiveness and efficacy between two intervention groups, comparison of time required for the transition from Bromage 0 to Bromage scores 1,2, and 3, comparison of time duration for the transition from B3 to B0 among the study participants between two groups, comparison of post intervention MAP between two interventional groups and comparison of post-intervention side effects between two intervention groups, all these were found to be statistically significant.
Conclusion: In comparison to ropivacaine, intrathecal administration of levobupivacaine produced an early onset of sensory and motor block, a prolonged duration of sensory and motor block,an early reach of peak block height anda prolonged two dermatome regression time.
Keywords: Subarachnoid Block, Isobaric Solution, Levobupivacaine, Ropivacaine, Elective Infraumbilical Surgeries.

Introduction

Levobupivacaine(S-l-butyl-2-piperidylformo-2',6'-xylididehydro-chloride),[1] the pure (S)- enantiomer of racemic Bupivacaine, is a newer long acting local anaesthetic agent, that has been recently used in clinical practice.[2,3] It is prepared as a sterile, colourless solution(pH 4- 6.5) containing Levobupivacaine hydrochloride equivalent to 2.5 mg /ml, 5 mg/ml, 7.5mg/ml of Levobupivacaine. It blocks nerve conduction in the sensory and motor nerves by blocking voltage sensitive sodium channels, potassium channels and calcium channels.[4] Ropivacaine, (S)-enantiomer of S-l-propyl-2', 6'-pipecoloxylidide is an amino-amide local anaesthetic with local anaesthetic properties similar to those of bupivacaine.[5,6] It was one of the first local anaesthetic agents to emerge as a possible replacement of bupivacaine.[7] It is presented as a single enantiomer that differs from levobupivacaine in the substitution of a propyl group for the butyl group on the piperidine ring.[8] Isobaric ropivacaine causes a reversible blockade of impulse propagation by preventing sodium channels from passing through the cell membrane. Its preparation comes in concentrations of 2mg/ml, 5mg/ml, 7.5mg/ml and 10 mg

/ml. With these designed changes in molecular structure, it was hoped that Ropivacaine and levobupivacaine would be less intrinsically cardiotoxic.

Aims and objectives

1. To compare the efficacy and effectiveness between (0.5%) levobupivacaine (17.5 mg) and (0.5%) ropivacaine (17.5mg) for patients undergoing infraumbilical surgery under spinal anaesthesia.
2. To compare the effectiveness between two drugs in terms of time to reach T10, peak block height, time to reach the peak block, duration of sensory block at T10 and two-segment regression time.
3. To compare the pre- and post-interventional hemodynamic profilesof two drugs
4. To observe any on-towards effects like bradycardia, hypotension, hypoxia, tremor, nausea and vomiting between the two interventional groups.
5. To compare the post-interventional VAS score between two groups.

Materials &methods

This was a hospital-based prospective randomized study conducted among 90 patients undergoing infraumbilical surgery under spinal anaesthesia at the Department of Surgery, S.C.B. Medical College and Hospital, from December 2020 to November 2022 after obtaining clearance from the institutional ethics committee and written informed consent from the study participants.

The study groups were divided into two equal groups randomly.

1. Group L-will be given 17.5 mg (3.5 ml) of isobaric levobupivacaine.
2. Group R-will be given 17.5 mg (3.5 ml) of isobaric ropivacaine.

Randomization

Randomization is random allocation of the subjects to various arms (Intervention groups) of the trial. Randomization for this study was done by random number distribution method. Here a serial number from 1 to 90 will be distributed randomly by between two groups. The patients selected for the study will be sequentially numbered and as per the previously assigned alphabet (L or R) to a particular group, the patient will be given medication assigned to that group.

Inclusion Criteria

1. Patients belonging to ASA grades I and II
2. Patients belonging to either sex
3. Age group 18-60 years
4. Elective infraumbilical surgical procedure under subarachnoid block with a duration of about 2.5 hours

Exclusion Criteria

1. Patients belonging to ASA grades III, IV and V.
2. Patient refusal
3. Liver and renal dysfunction
4. Anatomical abnormalities of the spine.
5. Allergy to drugs
6. History of migraine or any chronic headache preoperatively or on the morning of surgery.

Procedure

On the day of surgery, the patient was taken into the preoperative room 15 min before the scheduled time of surgery. Consent for anaesthesia and NPO status were checked and confirmed. Preanaesthetic evaluation chart was checked for any abnormal finding. Under sterile aseptic precautions, one peripheral venous catheter of 18G was inserted in one of the upper limb and Ringer's lactate solution infusion was started. The patients were randomized in the pre-op room into either of the two study groups L and R. After shifting to the OT table, saturation probe, NIBP, ECG were attached. Then the patient is made to remain in sitting position. Sterile painting was done in the area of lumber puncture using povidone iodine solution. The intervertebral space was palpated & lumbar puncture was done at L3-L4 interspace under strict aseptic condition using 25 G Quincke's needle. After confirming free flow of CSF, 3.5 ml of study drug was injected over 10 sec at the rate of 0.2 ml/sec. All patient of group L received 17.5 mg (3.5 ml) of 0.5% isobaric Levobupivacaine Hydrochloride and all patients of group R received 17.5 mg (3.5 ml) of 0.5% Isobaric Ropivacaine. Then a sterile dressing was applied over the site of injection & patient turned immediately into supine position with a pillow under the head & neck. All the patients received crystalloid solution and vitals like pulse rate, blood pressure, SpO2, were monitored & any unwanted complication noted intra-operatively.

The demographic data like age, sex, weight, BMI, duration of surgery was collected & compared and all efforts was taken to make this study bias free. The following hemodynamic parameters mentioned below was monitored every 5 minutes for the first 30 minutes and then subsequently every 10 minutes till the end of surgery.

1- Heart Rate
2- Non invasive blood pressure (SBP, DBP, MAP)
3- SpO2

The following data was evaluated during the study.

1. Sensory Blockade

Patients were tested with pin prick bilaterally along the midclavicular line for loss of sensation to pin prick to assess the sensory block. This assessment was started immediately after turning the patient supine and continued every minute till the peak block height was reached and the time noted. Sensory block was checked every 15mins till it reached two segment regression.

Assessment of grades of sensory blockade

GRADE 0 – Sharp pain felt
GRADE 1 – Analgesia, Dull sensation felt
GRADE 2 – Anaesthesia, No sensation felt
The onset of sensory block was defined as the time between the injection of anaesthetic and the loss of pinprick sensation at the T10 dermatomal level.

2. Visual Analog Scale

Preoperatively patient was explained in detail about Visual Analog Scale. The scores was evaluated in the postoperative ward and the time taken to reach VAS 4 is noted.
SCORE 0-2: No pain
SCORE 2-4: Mild pain
SCORE 4-6: Moderate pain
SCORE 6-8: Severe pain
SCORE 8-10: Unbearable pain

3. Motor Blockade

Bromage Scale was used to assess motor blockade bilaterally.
0- Full flexion of knees, hip
1- Unable to lift leg against gravity but is able to flex knee & ankle
2- Unable to flex knee and hip but is able to flex ankles
3- Unable to flex hip, knee, ankle
4- Complete paralysis

Complete motor block was deemed to be achieved when Bromage score of 4 will be reached. Duration for complete motor block recovery was taken as the time from subarachnoid injection to return of Bromage score to 0.

Statistical Methods

The data collected and tabulated in Microsoft Excel (Version 19). All the quantitative variables were expressed in terms of mean and SD and all the qualitative variables were expressed in proportion and percentage. The data were analyzed in SPSS version-23. Between the groups, the quantitative variables were compared by the applying unpaired-t test and the categorical variables were compared using the chi-square test. Taking the 95% CI, the p value <0.05 was considered statistically significant.

Results

Age	**Group-R (N=45)**	**Group-L (N=45)**	**P-Value**
Mean (SD)	57.42 (8.96)	57.56 (9.12)	0.94
Range	40.00 – 83.00	44.00 – 83.00	
Age Distribution			
Sex	**Group-R (N=45)**	**Group-L (N=45)**	**P-Value**
Female	12 (26.7%)	7 (15.6%)	0.20
Male	33 (73.3%)	38 (84.4%)	
Sex Distribution			

Table 1: Demographic Distribution

The mean ages of the study participants in group-L and group-R were 57.42 (8.96) and 57.56 (9.12) years respectively. There was no statistical difference in the age distribution of the study participants between the two groups. (p=0.94).Among the study participants, the proportion of females in group-L and R was 12 (26.7%) and 7 (15.6%) respectively, and the proportion of males in group-L and R was 33 (73.3%) and 38 (84.4%) respectively. There was no difference in the sex distribution of the study participants between the two groups (p=0.20).

	Group-R (N=45)	**Group-L (N=45)**	**P-Value**
Time_T10_Dermatome			0.022
Mean (SD)	6.41 (2.20)	5.20 (2.70)	
Time_to_Reach_Peak_Block			<0.001
Mean (SD)	28.31 (2.28)	19.88 (5.10)	
Duration_of_Sensory_Block_at_T10			<0.001
Mean (SD)	150.28 (37.24)	204.92 (46.84)	
Two_Segment_Regression_Time			<0.001
Mean (SD)	99.47 (16.88)	172.88 (34.45)	
Time_to_Reach_Vas_4			<0.001
Mean (SD)	235.96 (15.11)	187.74 (5.87)	
Comparison of Effectiveness and Efficacy Between Two Intervention Groups			
	Group-R (N=45)	**Group-L (N=45)**	**P-Value**
b0_b1			0.019
Mean (SD)	1.66 (0.69)	2.04 (0.83)	
Range	0.11 - 3.02	0.09 - 3.44	
b0_b2			<0.001
Mean (SD)	4.21 (1.56)	2.13 (1.14)	
Range	1.45 - 8.46	-0.18 - 4.86	
b0_b3			<0.001
Mean (SD)	5.67 (1.89)	1.56 (0.80)	
Range	0.38 - 8.57	0.30 - 3.40	
Comparison of Time Required for the Transition from Bromage 0 to Bromage Score 1,2,3			
Table 2			

To compare the effectiveness and efficacy, various parameters were compared, which were illustrated.

The time (min) to reach T10 dermatome for group-L was 6.41 (2.20) min, and in group-R it was 5.20 (2.70). The time was higher in group-R as compared to group-L and was found to be statistically significant. (p=0.022).

Similarly, the time to reach peak block in group-L was 28.31 (2.28) min and in group-R it was 19.88 (5.10). The time was lower in group-R as compared to group-L and was found to be statistically significant. (p<0.001).

The time for duration of sensory block at T-10 was 150.28 (37.24) in group-L and 204.92 (46.84) in group-R. There was a higher duration in group-R as compared to group-L and was found to be statistically significant. (p<0.001).

The two segment regression time in group-L was 99.47 (16.88) min and in group-R it was 172.88 (34.45). The time was higher in group-R as compared to group-L and was found to be statistically significant. (p<0.001).

Similarly, the time to reach peak block in group-L was 28.31 (2.28) min and in group-R it was 19.88 (5.10). The time was lower in group-R as compared to group-L and was found to be significant. (p<0.001).

The time to reach VAS score 4 in group-L was 235.96 (15.11) min and in group-R it was 187.74 (5.87) min. The time was lower in group-R as compared to group-L and was found to be significant (p<0.001).

The comparison of time required for the transition from Bromage-0 to Bromage-1, 2, and 3 scores. The time required for the transition from Bromage-0 to Bromage-1 in group-L and group-R was 1.66 (0.69) and 2.04 (0.83) respectively. A higher value was noted in group-R as compared to group-L and it was significant (p=0.019)

Similarly, the mean time for the transition from B0 to B2 for group-L patients was 4.21 (1.56) and for group-R, it was 2.13 (1.14) min. There was a significant difference in the time duration between the two intervention groups(p<0.001). The mean time for the transition from B0 to B3 for group-L patients was 5.67 (1.89) and for group-R, it was 1.56 (0.80) min. There was a significant difference in the time duration between the two intervention groups(p<0.001).

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B3_B0	Group-R (N=45)	Group-L (N=45)	P-Value
Mean (SD)	249.44 (76.18)	374.83 (70.07)	<0.001
Range	44.79 - 363.12	205.06 - 515.16	
Comparison of Time Duration for the Transition from B3 to B0 among the Study Participants Between Two Groups			
	Group-R (N=45)	**Group-L (N=45)**	**P-Value**
hr_0			0.46
Mean (SD)	77.22 (5.92)	76.25 (6.31)	
Range	62.42 - 90.10	63.83 - 90.62	
hr_5			0.72
Mean (SD)	74.60 (6.30)	75.09 (6.40)	
Range	60.83 - 90.03	60.52 - 87.65	
hr_10			0.032
Mean (SD)	70.47 (6.20)	73.39 (6.48)	
Range	59.35 - 89.42	55.54 - 85.33	
hr_15			<0.001
Mean (SD)	68.54 (5.53)	73.07 (6.15)	
Range	54.48 - 79.36	59.43 - 85.71	
hr_20			<0.001
Mean (SD)	74.94 (6.13)	69.61 (4.91)	
Range	63.10 - 89.21	55.06 - 80.41	
hr_25			0.11
Mean (SD)	72.64 (4.99)	70.90 (5.16)	
Range	64.15 - 82.51	60.24 - 81.86	
hr_30			0.029
Mean (SD)	74.10 (6.57)	71.19 (5.81)	
Range	60.39 - 86.91	57.71 - 80.81	
hr_40			<0.001
Mean (SD)	73.26 (5.11)	83.64 (5.17)	
Range	63.58 - 86.59	69.49 - 92.97	
hr_50			0.010
Mean (SD)	76.46 (6.27)	73.15 (5.60)	
Range	64.22 - 90.33	60.81 - 84.83	
hr_60			0.75
Mean (SD)	73.72 (5.23)	74.08 (5.30)	
Range	62.96 - 84.77	62.30 - 82.71	
Comparison of Post Intervention Heart Rate Between Two Interventional Groups			
Table 3			

The mean duration of time for the transition from B3 to B0 among the study participants in group-L was 374.83 minutes and in group-R it was 249.44 (76.18) minutes. Less time was required in group-R as compared to group-L and the finding was statistically significant. ($p<0.001$)

Post intervention heart rate was measured between two intervention groups at various time intervals, and the comparison was illustrated. A significant difference was observed between the two groups at 10, 20, 30, 40 and 50 minutes. ($p<0.05$).

	Group-R (N=45)	Group-L (N=45)	P-Value
map_0			0.51
Mean (SD)	85.30 (6.96)	84.35 (6.69)	
Range	73.05 - 99.18	67.49 - 99.36	
map_5			0.59
Mean (SD)	87.48 (6.77)	88.24 (6.64)	
Range	74.07 - 107.68	67.25 - 100.88	
map_10			<0.001
Mean (SD)	90.07 (5.83)	85.20 (7.18)	
Range	74.18 - 101.17	66.61 - 101.89	

map_15			<0.001
Mean (SD)	91.11 (6.25)	85.43 (5.59)	
Range	73.51 - 109.21	74.38 - 102.28	
map_20			<0.001
Mean (SD)	91.08 (5.67)	84.37 (8.22)	
Range	80.43 - 105.29	69.63 - 101.65	
map_25			<0.001
Mean (SD)	94.23 (5.76)	85.20 (5.38)	
Range	83.06 - 104.52	70.23 - 95.82	
map_30			<0.001
Mean (SD)	94.13 (6.57)	86.59 (5.97)	
Range	82.30 - 110.48	72.87 - 98.40	
map_40			<0.001
Mean (SD)	94.78 (5.89)	83.97 (6.74)	
Range	79.15 - 109.61	69.50 - 103.89	
map_50			<0.001
Mean (SD)	94.41 (5.29)	86.69 (6.26)	
Range	82.45 - 104.31	74.11 - 96.64	
map_60			<0.001
Mean (SD)	93.56 (6.92)	86.65 (6.35)	
Range	80.91 - 109.66	73.71 - 100.13	

Table 4: Comparison of Post Intervention MAP Between Two Interventional Groups

Post-intervention mean arterial pressure was measured between two intervention groups at various time intervals, and the comparison was illustrated. A significant difference was observed between two groups at 10, 15, 20, 25, 30, 40, 50 and 60 minutes. ($p<0.05$).

Side Effects	Group-R (N=45)	Group-L (N=45)	P-Value
Bradycardia	4 (8.9%)	10 (22.2%)	0.010
Headache	2 (4.4%)	0 (0.0%)	
Hypotension	10 (22.2%)	3 (6.7%)	
Nausea & Vomiting	0 (0.0%)	3 (6.7%)	
No S/E	24 (53.3%)	29 (64.4%)	
SPO2 below 93%	3 (6.7%)	0 (0.0%)	
Tremor	2 (4.4%)	0 (0.0%)	

Table 5: Comparison of Post-Intervention Side Effects Between Two Intervention Groups

Post-intervention side effects were illustrated.Among the study participants, 29 (64.4%) patients did not show any side-effects in group-L and 24 (53.3%) patients did not show any side effect in group-R. The most common side effects in group-L was bradycardia and in group-R it was hypotension. The comparison of side effects between two groups was found to be statistically significant.

Discussion

This study shows that the intrathecal administration of either 17.5 mg ropivacaine, or 17.5 mg levobupivacaine was well tolerated and an adequate block for lower abdominal surgery was achieved in all the patients.

Ropivacaine presented a slower onset and shorter duration of motor block as well as a faster resolution of sensory block compared with the levobupivacaine. The cephalic spread of sensory block was greater in the ropivacaine group (T7).

These results are partially in agreement with those of other investigators.[9,10] The present study is to compare the efficacy and safety of these two isobaric glucose-free solutions of ropivacaine (17.5mg) containing 5 mg/ml, and levobupivacaine (17.5) containing 5mg/ml as a sole anaesthetic agent in patients undergoing lower abdominal surgery under spinal anaesthesia.

McNamee et al.[11] compared 17.5mg of plain ropivacaine with 17.5 mg of plain bupivacaine in patients undergoing total hip arthroplasty under spinal anaesthesia. There were no significant differences in the upper extent of sensory block, in the onset of motor and sensory block, or in the intraoperative efficacy between the two groups. On the other hand, a more rapid postoperative recovery of sensory and motor function was seen in the ropivacaine group compared with the bupivacaine group, which is also in accordance with our findings but we compared ropivacaine with levobupivacaine. Some have argued that this is a specific drug effect of ropivacaine demonstrating an increased separation of the sensory and motor blocking effects by virtue of a

lower lipid solubility,[12,13] whereas others claim that the observed differences are merely due to the reduced potency of ropivacaine compared with bupivacaine.

Gautier et al.[14] compared the effects of intrathecal administration of either 8 mg isobaric bupivacaine, 8mg isobaric levobupivacaine, or 12mg isobaric ropivacaine, all combined with sufentanil 2.5 microgram in patients undergoing caesarean section. Once more, bupivacaine provided a longer duration of analgesia and motor block than ropivacaine. It was also associated with a significantly superior success rate to that observed in the levobupivacaine group, which was same as our results and those reported by Glaser et al., DanelliG et al.[15] and Cheng et al.

In addition, the two segment regression of spinal anaesthesia observed in patients receiving ropivacaine is faster in comparison to levobupivacaine. Same results found recently by Casati et al. However, in their study, no differences were observed in the onset time both of sensory and motor block between ropivacaine, levobupivacaine or bupivacaine. The reason for the observed differences between our results and those seen in the above-mentioned studies is not apparent, but it could be attributed to methodological differences, such as a difference in the dosage used, in the population studied, or in the potency.

Camorciaet al.[16] determined the analgesic potency ratios for three local anaesthetics for intrathecallabor analgesia. The relative analgesic potency ratios were 0.65 (0.56-0.76) for ropivacaine: bupivacaine, 0.80 (0.70-0.92) for ropivacaine: levobupivacaine, and 0.81 (0.69-0.94) for levobupivacaine: bupivacaine.In their study, there were significant trends for greater motor block with bupivacaine and levobupivacaine. In this prospective, randomized, double blinded, study with two equal groups, we found time to reach motor block (Bromage-1) same in the two groups (p=0.062).Where time to reach motor blocks (Bromage-2 and Bromage-3) earlier in the levobupivacaine group.

The slower onset of motor block in the ropivacaine group compared with that in the bupivacaine and levobupivacaine groups was also noticed by Coppejanset al., in a low-dose combined spinal-epidural anaesthesia for caesarean delivery. That study confirmed that these three local anaesthetics can beused successfully and induce less motor block but that ropivacaine requires at least a 50% larger dose than bupivacaine or levobupivacaine. In our study, we also found almost similar results.

Polleyet al. also ascertained that ropivacaine is approximately 40% less potent than bupivacaine when administered epidurally to abolish the pain of the first stage of labour.

Furthermore, Gautier et al. compared 4ml of intrathecal hyperbaric 0.2% bupivacaine (8mg) with 4ml of 0.2, 0.25, 0.3 or 0.35% hyperbaric ropivacaine (8, 10, 12 or 14 mg) in patients undergoing knee arthroscopy. In the ropivacaine group, adequate sensory and motor blocks were achieved only after the intrathecal administration of 12 or 14mg of ropivacaine. They estimated that the 12mg dose of ropivacaine was approximately equivalent to 8mg of bupivacaine. Although the duration of both sensory and motor block was significantly shorter in the ropivacaine group in our study, these differences were not as pronounced as those seen in the above-mentioned study, as we took an equal dose of the study drug. This may reflect a difference in the dosage used, in the baricity of the solution used or in potency.

Jose Jaevieret al. compared the sensory, motor, and neuroophthalmological effects of isobaric levobupivacaine and bupivacaine in knee arthroscopy under spinal Anaesthesia Patients received 12.5mg of isobaric bupivacaine or levobupivacaine. Sensory and motor blockade onset was faster in the bupivacaine group. T6 (T2-T12) and T3 (T2-T12) were the highest sensory block levels for the levobupivacaine and bupivacaine groups, respectively. It took less time to regain maximum motor blockade in the bupivacaine group, and the levobupivacaine group required the use of analgesia earlier in comparsion to levobupivacaine. So, isobaric bupivacaine and levobupivacaine are analogous and well-tolerated anaesthetics for knee arthroscopy. However, for bupivacaine, sensory and motor blockade onset was faster, anda longer postoperative analgesia period was achieved. In our study, we compared only different parameters of sensory and motor block among isobaric ropivacaine and isobaric levobupivacaine, where onset of sensory and motor blockade was faster in isobaric levobupivacaine group in comparison to the ropivacaine group.

In another study by Jean-Marc et al.[17] in patients undergoing transurethral resection of the bladder or prostate, patients were randomized to receive either 5 ml of 0.2% isobaric bupivacaine (10 mg) or 5 ml of 0.3% isobaric ropivacaine (15 mg) for spinal anaesthesia. Despite the fact that a lower dose of bupivacaine was used in comparison with ropivacaine, there was a significant increase in the cephalad spread of the sensory block in the bupivacaine group. In our study, we found more (maximum T7) cephalad spread in ropivacaine group. The degree of motor block was similar, which is in accordance with our study, where a lower intensity of motor block was seen with ropivacaine than with bupivacaine at the same dose.

Lee YYMuchhal K et al.[18]compared the clinical efficacy and motor block of 0.5% levobupivacaine with 0.5% racemic bupivacaine in spinal anaesthesia for urological surgery. Spinal anaesthesia was achieved with 2.6ml of study solution injected in the subarachnoid space at the lumbar 3/4 interspace. There were no significant differences between the two groups in the quality of sensory and motor blocks or in haemodynamic change.

Anaesthesia was adequate and patient satisfaction was good in all cases. They conclude that 0.5% levobupivacaine can be used as an alternative to 0.5% racemic bupivacaine in spinal anaesthesia for surgery when a sensory block of at least T10 is required. In our study, the onset of sensory and motor block was earlier peak block height was higher earlier in the levobupivacaine group.

Sensory block in the present study was tested using loss of sensation to pin-prick as used by M. Mantaouvalaou et al.[19]. 3S, Van Kleef J W et al.[20].The choice of this method, instead of others (such as loss of sensation to ice, pain perception, tetanic twitch or chemical irritation with capsaicin), was based on Hocking's study[21]which proved the reliability and easy application of the pinprick method. In the study by Ritika Jindal et al. showing levobupivacaine had a longer duration of sensory block and time to 2-segment regression (T8-T10) when compared with the ropivaciane group and a longer duration of motor block with the levobupivacaine group ($p<0.05$) which was similar to our study results.[22]

Nalini et al. in their studyfound that the intrathecal isobaric 0.5% ropivacaine produceda statistically significant shorter duration of motor block. The hemodynamics and the motor block are similar in both groups and the results are comparable with our study[23]and those reported by Helena, Kallio et al.In terms of safety, either intrathecalropivacaine, levobupivacaine provide a high degree of cardiovascular stability. The most commonly reported adverse events, nausea, vomiting, tremor, and a decrease in oxygen saturation SpO2 <93%, were equally distributed between the two groups. These results correlate well with those reported by other investigators.

Conclusion

To conclude the study, in comparison to ropivacaine, intrathecal administration of levobupivacaine, produced an early onset of sensory and motor block, prolonged duration of sensory and motor block, early reach of peak block height and a prolonged two dermatome regression time.

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