MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2024.6.246.249

OPEN ACCESS

Key Words
Levobupivacaine, bupivacaine, lower abdominal surgeries

Corresponding Author
Meghana B. Narayan,
ESIC Medical College and PGIMSR, Rajajinagar, Bangalore, Karnataka, India

Author Designation
[1-4]Senior Resident
[5]Professor

Received: 12 March 2024
Accepted: 20 April 2024
Published: 6 May 2024

Citation: T.K. Haridadeeswaran, M. Adithya, Dikshapreet, Meghana B. Narayan and C.G.S. Prasad, 2024. A Study to Compare Intrathecal Levobupivacaine Versus Bupivacaine in Lower Abdominal Surgeries for Motor Blockade. Res. J. Med. Sci., 18: 246-249, doi: 10.59218/makrjms.2024.6.246.249

A Study to Compare Intrathecal Levobupivacaine Versus Bupivacaine in Lower Abdominal Surgeries for Motor Blockade

[1]T.K. Haridadeeswaran, [2]M. Adithya, [3]Dikshapreet, [4]Meghana B. Narayan and [5]C.G.S. Prasad
[1-5]ESIC Medical College and PGIMSR, Rajajinagar, Bangalore, Karnataka, India

Abstract
Levobupivacaine has been found to be equally efficacious as bupivacaine but with superior pharmacokinetic profile. Plain levobupivacaine is shown to be isobaric in comparison to Cerebrospinal fluid and thus leads to more predictable drug spread, decreasing the incidence of hypotension and bardycardia. Data was collected from patients posted for lower abdominal surgeries in Department of anaesthesiology, pain and critical care. 60 patients were enrolled in this study, 30 in each group with inclusion and exclusion criteria. The mean time to onset of motor blockade in group B was 12.1±3.0min and in group L was 12.9±1.7min. with the p value of 0.067, which was not significant. The mean duration of motor block in group B was 152.3±13.1min and in group L was 123.5±9.9min. The p value was significant <0.001.

INTRODUCTION

The quest for searching newer and safer anaesthetic agents has always been one of the primary needs in anaesthesiology practice. At present hyperbaric bupivacaine is commonly used intrathecally for lower abdominal and lower limb surgeries. However, the use of hyperbaric racemic bupivacaine in spinal anaesthesia has some drawbacks.

Bupivacaine is available as a racemic mixture of 50:50 of its two enantiomers levobupivacaine S(-) isomer and dextrobupivacaine R(+) isomer. Several central nervous system and cardiovascular adverse effects have been linked to R(+) isomer are noted in literature after inadverant intravenous injection or intravenous regional anaesthesia. Levorotatory isomer were shown to have safer pharmacological profile, with less cardiac and neural toxicity[1,2].

Levobupivacaine has been found to be equally efficacious as bupivacaine but with superior pharmacokinetic profile. Plain levobupivacaine is shown to be isobaric in comparison to Cerebrospinal fluid and thus leads to more predictable drug spread, decreasing the incidence of hypotension and bradycardia[2,3,4,5].

Levobupivacaine also results in earlier motor recovery compared with racemic bupivacaine[5,6]. These advantages make levobupivacaine an attractive alternative to racemic bupivacaine for spinal anaesthesia. Also, such an increased usage, mandates documentation of evidence-based literature with regard to risk and safety concerns as well as clinical issues related to levobupivacaine. Hence the study is chosen to compare intrathecal levobupivacaine versus bupivacaine in lower abdominal surgeries for motor blockade.

MATERIALS AND METHODS

Data was collected from patients posted for lower abdominal surgeries in Department of anaesthesiology, pain and critical care. 60 patients were enrolled in this study, 30 in each group with below mentioned inclusion and exclusion criteria.

Inclusion Criteria:

- Patients who are willing to give written/informed consent
- American society of anaesthesiologist grade 1 and 2 patients
- Age 18-60 years of either gender
- Patients undergoing lower abdominal surgeries
- Patients free from cardiac and respiratory dysfunction

Exclusion Criteria:

- American society of Anaesthesiologist grade >2
- Patients with known contraindications for spinal anaesthesia
- Patients with haemodynamic instability
- Patient on antihypertensives and anti-depressents

After obtaining ethical clearance and detailed examination, informed written consent was obtained from the patients who fullfilled the above mentioned inclusion and exclusion criteria after explaining the merits and demerits of the procedure.

Patients were randomized to two groups by computer generated randomization table by the guide and patients were randomly allocated into two groups, L and B of 30 each.

Group L received 2.5 ml of 0.5% isobaric levobupivacaine.

Group B received 2.5ml of 0.5% hyperbaric bupivacaine.

RESULTS AND DISCUSSIONS

The mean onset of sensory blockade in group B was 4.9±2.2min and in group L was 4.8±2.1 min. The p value was 0.832 which was not significant.

The highest level of sensory blockade achieved in group B was T 6 (T6-T8)* and in group L was T8 (T6-T8)*. The p value was 0.124 which was non-significant. (*Median and Range).

The mean time to attain highest sensory level in group B was 13.2±2.1min and in group L was 12.6±2.2. With the p<0.284 which was non significant.

The mean time to 2 segment regression in group B was 79.8±3.2 min and in group L was 75.7±14.7 min. The p value 0.141 which was non-significant.

The mean time for regression of sensory level to level S1 in group B was181.8±11.9 min and in group L 149.8±12.8. with the significant p<0.001.

The mean time for rescue analgesia in group B was 173.7±9.8 min and in group L was 152.4±5.2min. With the significant p<0.001.

The mean time to onset of motor blockade in group B was 12.1±3.0min and in group L was 12.9±1.7 min. with the p value of 0.067, which was not significant.

The mean duration of motor block in group B was 152.3±13.1 min and in group L was 123.5±9.9 min. The p value was significant <0.001.

In our study the mean time for onset of motor blockade was 12.1±3 minutes in group B and in group L was 12.9±1.7 minutes with the p value of 0.067, which was not significant. Gautier *et al*.[7] in their study had defined onset time for motor blockade as the time to achieve maximum bromage score and observed the mean (SD) and median (Range). In bupivacaine group the mean was 9±6 minutes and median (range) was 9 minutes (4-30) and in levobupivacaine group it was 13±6 minutes and 10 (5-30), respectively. Feroz *et al*.[8] in their study had defined the onset of motor block as

Table 1: Mean onset of sensory blockade between the study groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Onset of Sensory Blockade (Min)	4.9	±2.2	4.8	±2.1	0.832 (Not significant)

Table 2: Table showing number of patients who attained highest sensory blockade and the median (Range) of the blockade

Highest Level of Sensory Block Achieved	B Group		L Group		
	N	Percentage	N	Percentage	p-value
T4	6	20.0	2	6.6	0.124
T6	11	36.6	10	33.3	
T8	13	43.3	18	60.0	
Total	30	100.0	30	100.0	
Median	T6	T8			
Range	T6-T8	T6-T8			

Table 3: Mean Time to Attain Highest Sensory Level

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Time to Attain Highest Sensory Level (Minutes)	13.2	±2.1	12.6	±2.2	0.284

Table 4: Mean Time to 2 Segment Regression between Study Groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Time to 2 Segment Regression (Minutes)	79.8	±3.2	75.7	±14.7	0.141 (Not significant)

Table 5: Time for Regression of Sensory Level to S1 Between Study Groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Time For Regression of Sensory Level to S1 (Minutes)	181.8	±11.9	149.8	±12.8	<0.001* (significant)

Note: p value* significant at 5% level of significance (p<0.05).

Table 6: Mean Time for Rescue Analgesia between Study Groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Time to Rescue Analgesia (Minutes)	173.7	±9.8	152.4	± 5.2	<0.001* (Significant)

Note: p value* significant at 5% level of significance (p<0.05).

Table 7: Mean onset Time for motor block between the study groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Time for Onset of Motor Blockade (Minutes)	12.1	±3.0	12.9	±1.7	0.067 (Not-significant)

Table 8: Mean duration of motor block between Study Groups

Parameters	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Mean Duration of Motor Block (Minutes)	152.3	±13.1	123.5	±9.9	<0.001* (significant)

Note: p value* significant at 5% level of significance (p<0.05).

time to attain bromage scale 1 and found the mean time to onset of motor block in bupivacaine group was 3.9±0.5 minutes and in levobupivacaine group as 4.0±0.3 minutes with the p value of 0.1141, which was not significant. Duggal *et al*.[9] in their study have noted that the mean time to onset of motor block as 2.87±0.57 minutes in bupivacaine group and in levobupivacaine group was 3.87±1.22 minutes with the p<0.001 which was significant. The results of above studies indicate that bupivacaine has faster onset of motor blockade compared to levobupivacaine. The variations in the motor block onset time may be attributed to the difference in study population (pregnancy), dose of local anesthetics used and the parameter used to define the onset time.

In our study the mean duration of motor blockade was defined as onset of modified bromage score 3 to bromage score 1. The mean duration of motor blockade was 152.3±13.1 minutes in group B and 123.5 ± 9.9 minutes in group L, with the p<0.001 which was statistically significant. Gautier *et al*.[7] in their study had defined the duration of motor block as time to attain from maximum to lowest bromage score and have found the mean duration of motor block as

142±30 minutes in bupivacaine group and 121±25 minutes in levobupivacaine group. Sahin *et al*.[10] in their study have found the mean recovery time of motor block as 216±59 minutes in levobupivacaine group and in bupivacaine group was 293±10.7 minutes with the p<0.05, which was statistically significant. Duggal *et al*.[9] in their study had defined the duration of motor blockade as the time from the maximum level to complete disappearance of motor block, have found the mean duration of motor block as 64.37±7.42 minutes in levobupivacaine group and 94.7±9.18 minutes in bupivacaine group with the p<0.001, which was statistically significant. Feroz *et al*.[8] in their study, have defined duration of motor block as complete regression of motor blockade, have found mean regression time for the motor block as 135.0±15.6 minutes in levobupivacaine group and in bupivacaine group as 145±20. 50 minutes with the p value of 0.0036, which was statistically significant. The results of above studies indicates bupivacaine provides longer duration of motor blockade. The variations in the above studies on duration of motor blockade can be attributed to different study population (pregnancy), dose of local anesthetic and the parameters used to define it.

In our study the mean time to rescue analgesia was 173.7±9.8 minutes in group B and in group L was 152.4±5.2 minutes with the p<0.001, which was statistically significant. Gautier *et al*.[7] in their study have found the mean time to rescue analgesia as 157±17 minutes in bupivacaine group and 136±21 minutes in levobupivacaine group with the p<0.001, which was statistically significant. Singh *et al*. in their study have found the mean duration of analgesia as 243.9±13.8 minutes in bupivacaine group and 238.2±19.1 minutes in levobupivacaine group with the p value of 0.092, which was statistically not significant. Duggal *et al*.[9] in their study they have found the mean time to rescue analgesia was 103±10.18 minutes in bupivacaine group and 80.03±8. 12 minutes in levobupivacaine group with the p<0.001, which was statistically significant. The result of above studies concurs with our results and indicate that the bupivacaine provides longer duration of analgesia. The variation in the duration of rescue analgesia in all the above studies can be attributed to the dose of local anaesthetics used and different study population (pregnancy).

CONCLUSION

In our study comparing intrathecal isobaric levobupivacaine and hyperbaric bupivacaine the results indicates the duration of motor block and duration of rescue analgesia were longer in bupivacaine group. The onset of sensory and motor blockade were comparable. To conclude levobupivacaine provides shorter duration of motor and sensory blockade compared to bupivacaine and can be used as a effective alternate to bupivacaine for lower abdominal surgeries and ambulatory surgeries.

REFERENCES

1. McLeod, G.A. and D. Burke, 2001. Levobupivacaine. Anaesthesia, 56: 331-341.
2. Casati, A. and M. Baciarello, 2006. Enantiomeric local anesthetics: Can ropivacaine and levobupivacaine improve our practice? Curr. Drug Ther., 1: 85-89.
3. McLeod, G.A., 2004. Density of spinal anaesthetic solutions of bupivacaine, levobupivacaine and ropivacaine with and without dextrose. Br. J. Anaesth., 92: 547-551.
4. Erdil, F., S. Bulut, S. Demirbilek, E. Gedik, N. Gulhas and M.O. Ersoy, 2009. The effects of intrathecal levobupivacaine and bupivacaine in the elderly. Anaesthesia, 64: 942-946.
5. Gulen, G., G. Cakir, A. Ulgey, F. Ugur, C. Bicer, I. Gunes and A. Boyaci, 2012. A comparison of spinal anesthesia with levobupivacaine and hyperbaric bupivacaine for cesarean sections: A randomized trial. Open J. Anesthesiol., 2: 84-89.
6. Collins, V.J., 1993. Spinal analgesia-physiologic effects. In: Principles of Anaesthesia: General and Regional Anaesthesia,, Collins, V.J., (Ed.)., Lea and Febiger, Philadelphia, Pennsylvania, USA., ISBN-13: 9780812113228, pp: 1498-1520.
7. Gautier, P., M.D. Kock, L. Huberty, T. Demir, M. Izydorczic and B. Vanderick, 2003. Comparison of the effects of intrathecal ropivacaine, levobupivacaine and bupivacaine for caesarean section. Br. J. Anaesth., 91: 684-689.
8. Del-Rio-Vellosillo, M., J.J. Garcia-Medina, A. Abengochea-Cotaina, M.D. Pinazo-Duran and M. Barbera-Alacreu, 2014. Spinal anesthesia for knee arthroscopy using isobaric bupivacaine and levobupivacaine: Anesthetic and neuroophthalmological assessment. BioMed. Res. Int., Vol. 2014 .10.1155/2014/349034.
9. Duggal, R., R. Kapoor and G. Moyal, 2015. A comparison of intrathecal levobupivacaine with hyperbaric bupivacaine for elective cesarean section: A prospective randomized double-blind study. J. Obstetric. Anaesth. Crit. Care, 5: 78-83.
10. Sahin, A.S., G. Türker, A. Bekar, H. Bilgin and G. Korfali, 2013. A comparison of spinal anesthesia characteristics following intrathecal bupivacaine or levobupivacaine in lumbar disc surgery. Eur. Spine J., 23: 695-700