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Intrathecal Levobupivacaine Versus Bupivacaine in Lower Abdominal Surgeries: Hemodynamic Changes

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Abstract
Levobupivacaine has a safety margin of 1.3, which means toxic effects are not seen until the concentration rises by 30%. The concentration necessary to produce cardiac and neurotoxicity is higher for levobupivacaine than for racemic bupivacaine. There are three case reports of successful resuscitation after inadvertent intravenous injection. A prospective randomized comparative study was conducted after obtaining the approval of institutional ethical committee. 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. In our study hypotension was rerecorded in 4 patients (13%) from group B and 1 patient (3.3%) from group L with the p value of 0.021, which was statistically significant. Bradycardia was noted in 3 patients (10%) from group B and 1patient (3.3%) from group L with the p value of 0.053, which was not significant.

INTRODUCTION

Bupivacaine being an amide drug, the liver is the primary site of metabolism, and most of the drug is metabolized by N-dealkalization. Data in humans suggest that the amide hydrolysis is less important and the main product 2, 6 pipeco-loxylidine (ppx) is formed by conjugation in the liver with glucuronides. It crosses the placental barrier as any other local anaesthetic by passive diffusion, but the lowest level of placental diffusion is reported for this drug (Umbilical vein/Maternal ratio is 0.31-0.44)[1]. No effects on foetus are noted. About 10% of the drug is excreted unchanged in urine within 24 hours. Lung is capable of extracting Bupivacaine hence limits the concentration of the drug which reaches the systemic circulation for distribution to coronary and cerebral circulation. Propranolol impairs Bupivacaine extraction by lungs reflecting a common receptor site for these two drugs[2].

Levobupivacaine has a safety margin of 1.3, which means toxic effects are not seen until the concentration rises by 30%. The concentration necessary to produce cardiac and neurotoxicity is higher for levobupivacaine than for racemic bupivacaine. There are three case reports of successful resuscitation after inadvertent intravenous injection. The presentations were severe hypotension and bradycardia after a drug error; loss of consciousness, convulsions, hypotension and changes in QRS pattern of ECG after presumed intravenous injection during lumbar plexus block and loss of consciousness and convulsions after (a) spinal (b) sciatic nerve and (c) continuous lumbar plexus blocks. In all cases, resuscitation was successful with supportive measures, with or without pressor drugs and intravenous lipid emulsion. Recently studies have been carried out comparing the beneficial effects of vasopressor drugs and lipid therapy in local anesthetic systemic toxicity (LAST). Epinephrine should be used in small doses (10 100 µg) in adults. The use of vasopressin is not recommended. Lipid emulsion therapy should be considered at the first signs of LAST, after airway management. Successful resuscitation has been reported with intralipid emulsions in a peri arrest condition following use of levobupivacaine in lumbar plexus block[3,4].

MATERIALS AND METHODS

A prospective randomized comparative study was conducted after obtaining the approval of institutional ethical committee. 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 antidepressents

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

Above table and figure shows the systolic blood pressure at different intervals between the study groups and we found no statistically significant difference.

Above table and figure shows the diastolic blood pressure at different intervals between the study groups and we found no statistically significant difference.

Above table and figure shows the mean arterial blood pressure at different intervals between the study groups and we found no statistically significant difference.

Above table and figure shows the heart rate at different intervals between the study groups and we found no statistically significant difference.

The number of patients in group B had bradycardia was 3(10%) and 1(3.3%) in group L. The p value was 0.069 which was non-significant.

The number of patients in group B who had hypotension was 4 (13.3%) and 1 (3.3%) in group L The p value was 0.069 which was non-significant.

Table 1: Mean Distribution of SBP Between Study Groups

	Group B		Group L		
SBP in mmHg	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Basal	131.6	±23.0	131.8	±15.0	0.228(Not significant)
5 min	136.8	±16.9	126.2	±15.6	0.055(Not significant)
10 min	124.7	±28.1	122.9	±14.5	0.748(Not significant)
15 min	125.6	±18.1	121.5	±14.1	0.332(Not significant)
20 min	125.4	±16.3	122.3	±12.6	0.425(Not significant)
25 min	128.2	±15.8	122.2	±10.3	0.091(Not significant)
30 min	128.5	±15.7	122.2	±8.9	0.063(Not significant)
35 min	129.2	±15.5	122.2	±9.1	0.037(Not significant)
40 min	129.5	±15.4	123.0	±9.7	0.055(Not significant)
45 min	128.6	±16.4	122.2	±9.6	0.070(Not significant)
50 min	127.6	±15.3	121.9	±10.9	0.102(Not significant)
55 min	126.7	±13.3	122.2	±10.0	0.150(Not significant)
60 min	126.1	±12.4	121.4	±8.3	0.092(Not significant)
65 min	125.5	±12.4	120.3	±8.4	0.064(Not significant)
70 min	126.0	±13.0	122.6	±8.9	0.241(Not significant)
80 min	126.2	±12.1	122.7	±10.5	0.256(Not significant)
90 min	126.3	±12.9	121.2	±9.6	0.088(Not significant)
100 min	126.2	±13.2	121.8	±10.4	0.147(Not significant)
110 min	126.0	±13.0	123.6	±12.1	0.462(Not significant)
120 min	126.1	±13.0	121.7	±10.2	0.145(Not significant)

Table 2: Mean Distribution of DBP between Study Groups

	Group B		Group L		
DBP in mmHg	**Mean**	**SD**	**Mean**	**SD**	**p-value**
BASAL	82.3	±8.1	82.1	±6.7	0.889(Not significant)
5 min	79.8	±8.0	78.0	±8.1	0.373(Not significant)
10 min	75.7	±8.3	76.1	±7.3	0.856(Not significant)
15 min	74.6	±7.6	75.1	±8.0	0.780(Not significant)
20 min	74.1	±10.2	75.6	±9.2	0.561(Not significant)
25 min	74.7	±9.4	75.9	±7.4	0.563(Not significant)
30 min	74.4	±8.5	77.4	±7.0	0.145(Not significant)
35 min	74.1	±7.8	76.0	±6.0	0.288(Not significant)
40 min	73.5	±8.3	77.3	±6.9	0.055(Not significant)
45 min	73.5	±8.7	77.6	±7.8	0.060(Not significant)
50 min	73.5	±8.7	76.8	±9.2	0.154(Not significant)
55 min	73.3	±9.0	76.4	±8.1	0.162(Not significant)
60 min	72.9	±8.7	76.2	±8.4	0.150(Not significant)
65 min	72.6	±8.0	76.0	±8.1	0.107(Not significant)
70 min	72.6	±7.8	75.7	±7.6	0.128(Not significant)
80 min	73.1	±7.8	75.7	±8.1	0.217(Not significant)
90 min	73.0	±7.8	75.7	±8.1	0.201(Not significant)
100 min	73.0	±7.9	75.7	±8.1	0.196(Not significant)
110 min	73.2	±8.2	75.7	±8.1	0.233(Not significant)
120 min	73.1	±7.8	75.7	±8.1	0.216(Not significant)

Table 3: Mean Distribution of Map between Study Groups

	Group B		Group L		
MAP in mmHg	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Basal	83.7	±15.2	89.1	±14.8	0.169(Not significant)
5 min	82.4	±13.4	86.5	±12.5	0.222(Not significant)
10 min	81.1	±11.1	85.0	±12.1	0.199(Not significant)
15 min	82.6	±17.3	86.9	±11.8	0.593(Not significant)
20 min	84.5	±27.7	88.3	±33.7	0.506(Not significant)
25 min	97.9	±14.3	93.6	±7.7	0.152(Not significant)
30 min	97.4	±13.4	93.0	±8.5	0.141(Not significant)
35 min	93.7	±13.2	91.7	±6.7	0.462(Not significant)
40 min	92.1	±12.3	91.4	±7.6	0.801(Not significant)
45 min	91.4	±12.6	90.7	±8.2	0.790(Not significant)
50 min	91.7	±11.1	90.9	±6.9	0.749(Not significant)
55 min	93.1	±11.4	91.3	±6.2	0.468(Not significant)
60 min	92.7	±10.9	90.6	±6.6	0.371(Not significant)
65 min	92.6	±11.0	91.5	±6.4	0.616(Not significant)
70 min	92.1	±10.9	90.7	±7.0	0.557(Not significant)
80 min	92.3	±10.9	90.8	±7.6	0.548(Not significant)
90 min	91.7	±10.7	90.9	±7.4	0.738(Not significant)
100 min	91.3	±9.9	91.0	±7.0	0.881(Not significant)
110 min	91.2	±9.6	91.0	±7.2	0.939(Not significant)
120 min	91.0	±9.4	90.9	±7.0	0.950(Not significant)

Table 4: Mean Distribution of HR Between Study Groups

HR	Group B		Group L		
	Mean	SD	Mean	SD	p-value
Basal	87.2	±13.3	84.6	±11.8	0.419(Not significant)
5 min	76.0	±12.3	76.9	±10.5	0.762(Not significant)
10 min	74.6	±13.1	74.1	±8.9	0.882(Not significant)
15 min	74.2	±11.4	75.0	±9.8	0.754(Not significant)
20 min	73.7	±11.9	75.1	±10.4	0.637(Not significant)
25 min	71.4	±16.1	74.4	±10.2	0.393(Not significant)
30 min	74.1	±10.0	74.2	±9.8	0.969(Not significant)
35 min	74.7	±9.5	74.8	±9.0	0.978(Not significant)
40 min	72.2	±10.3	74.2	±9.8	0.452(Not significant)
45 min	73.0	±8.7	73.0	±9.3	0.977(Not significant)
50 min	72.4	±9.1	72.8	±8.5	0.873(Not significant)
55 min	73.0	±8.0	73.0	±9.1	0.988(Not significant)
60 min	72.7	±8.2	73.8	±9.7	0.626(Not significant)
65 min	72.5	±8.3	72.8	±9.0	0.905(Not significant)
70 min	72.5	±8.2	72.7	±9.3	0.942(Not significant)
80 min	72.3	±8.3	74.2	±9.0	0.405(Not significant)
90 min	72.6	±8.3	73.5	±8.9	0.687(Not significant)
100 min	72.6	±8.4	73.9	±8.8	0.580(Not significant)
110 min	72.6	±8.3	73.9	±8.6	0.535(Not significant)
120 min	72.5	±8.3	73.8	±9.4	0.582(Not significant)

Table 5: Number of Patients (Percentage) Developed Bradycardia between Study Groups

Side Effect	Group B		Group L		
	N	Percentage	N	Percentage	p-value
Bradycardia	3	10.0	1	3.3	0.053(Not significant)

Table 6: Number of Patients (Percentage) Developed Hypotension Between Study Groups

Side Effect	Group B		Group L		
	N	Percentage	N	Percentage	p-value
Hypotension	4	13.3	1	3.3	0.021*(significant)

In our study hypotension was rerecorded in 4 patients (13%) from group B and 1 patient (3.3%) from group L with the p value of 0.021, which was statistically significant. Bradycardia was noted in 3 patients (10%) from group B and 1patient (3.3%) from group L with the p value of 0.053, which was not significant. Feroz AD *et al*[5]. In their study (n=50) recorded hypotension in 12 patients (24%) in levobupivacaine group and 15 patients (30%) in bupivacaine group with the p value of 0.6529 which was not significant. Bradycardia was recorded in 4 patients (8%) from levobupivacaine group and 6 patients (12%) in bupivacaine group with the p value of 0.7407 which was not significant. Duggal R *et al*[6]. In their study (n=30) observed hypotension in 3 patients (10%) in levobupivacaine group and 10 patients (33.3%) in bupivacaine group with p value of <0.05, which was significant and bradycardia was observed in 1 patient (3.3%) from levobupivacaine group and 5 patients (16%) from bupivacaine group, with the p value of >0.05, which was not significant. Singh A *et al* [7]. In their study (n=50) observed hypotension in 6 patients (12%) from levobupivacaine group and 16 patients (32%) from bupivacaine group with the p value of 0.028, which was significant. And bradycardia was observed in 2 patients (4%) from levobupivacaine group and 3 patients (6%) from bupivacaine group, with the p value of 0.999, which was not significant. The results of our study concurs with above studies[8].

CONCLUSION

The number of patients in group B had bradycardia was 3(10%) and 1(3.3%) in group L. The p value was 0.069 which was non-significant.

The number of patients in group B who had hypotension was 4 (13.3%) and 1 (3.3%) in group L. The p value was 0.069 which was non-significant.

REFERENCES

1. Chin, K.J., M.K. Karmakar, P. Peng and D.S. Warner, 2011. Ultrasonography of the adult thoracic and lumbar spine for central neuraxial blockade. Anesthesiology, 114: 1459-1485.
2. Conroy, P.H., C. Luyet, C.J. McCartney and P.G. McHardy, 2013. Real-time ultrasound-guided spinal anaesthesia: A prospective observational study of a new approach. Anesthesiol. Res. Pract., Vol. 2013 .10.1155/2013/525818
3. Berde, C.B. and G.R. Strichartz, 2010. Local anesthetics. In: Miller's Anesthesia,, Miller, R.D., (Ed.)., Churchill Livingstone Elsevier, Philadelphia, Pennsylvania, ISBN-13: 9780443069598, pp: 913-936.
4. Stoelting, K.R. and C.S. Hiller, 2006. Local anesthetics. In: Pharmacology and Physiology in Anesthesia Practice,, Stoelting, R.K. and S. Hillier, (Eds.)., Lippincott and Wilkins, Philadelphia, USA., ISBN-13: 9780781754699, pp: 197-201.

5. 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
6. 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.
7. Singh, A., A. Gupta, P.K. Datta and M. Pandey, 2018. Intrathecal levobupivacaine versus bupivacaine for inguinal hernia surgery: A randomized controlled trial. Korean J. Anesthesiol., 71: 220-225.
8. Huang, Y.F., M.E. Pryor, L.E. Mather and B.T. Veering, 1998. Cardiovascular and central nervous system effects of intravenous levobupivacaine and bupivacaine in sheep. Anesth. Analg., 86: 797-804.