



COMPARATIVE EVALUATION OF 0.5% LEOBUPIVACAINE (H) V/S 0.75% HEAVY ROPIVACAINE (H) FOR USE IN SPINAL ANAESTHESIA IN INFRA UMBILICAL SURGERIES IN GERIATRIC AGE GROUP.

Anaesthesiology

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ABSTRACT

Introduction: Spinal anaesthesia is based on the dosage and strength of the drug used. Baricity is a term used to describe the relative density of an anaesthetic solution in relation to cerebrospinal fluid (CSF), in addition to its application in spinal anaesthesia. In surgical procedures, levobupivacaine and ropivacaine are the newly introduced anaesthetic drugs. **Aim:** To compare the 0.5% heavy levobupivacaine v/s 0.75% heavy ropivacaine for use in spinal anaesthesia in infra umbilical surgeries in geriatric age group. **Material and methods:** The present study was conducted in Acharya Shri Chander College of Medical Sciences & Hospital, Jammu over a period of one year and a total of 60 geriatric patients who underwent lower abdominal surgical procedures under spinal anaesthesia were included and monitored for hemodynamic effect and other parameters after administration of 3ml 0.5% hyperbaric Levobupivacaine and 3ml 0.75% hyperbaric ropivacaine. The collected data was recorded in Microsoft Excel sheet and analysed with the help of SPSS version 22.0. **Result:** The mean age of the study subjects in Group A was 65.2 ± 7.34 years and in Group B was 62.6 ± 9.81 . Majority of the study subjects were males and male to female ratio was 1.6:1. There was no statistically significant difference in terms of pulse rate. The observed side effects were bradycardia, hypoxia, hypotension, nausea, vomiting, dry mouth, dizziness, headache, respiratory depression and shivering. **Conclusion:** It is concluded that because of the short duration of the motor block, ropivacaine was beneficial.

KEYWORDS

Levobupivacaine, Ropivacaine, Spinal anaesthesia, Surgery, Outcome and Abdominal surgery.

INTRODUCTION

There is no ideal anesthetic for geriatric patients. In elderly patients, lower abdominal surgeries can be performed under regional anaesthesia. Neuraxial anesthesia remains a well-accepted option to minimize the surgical stress (tachycardia and hypertension), reduce the pulmonary compromise (atelectasis, pneumonia, prolonged mechanical ventilation), thus showing superior postoperative pain control and reduction of perioperative opioids consumption, hence minimizing opioid side effects. Neuraxial anesthesia results in better peripheral vascular circulation and reduces total blood loss. Neuraxial anesthesia also reduces the incidence of POCD in the first postoperative week (4). In addition, neuraxial anesthesia favors early ambulation thus preventing deep venous thrombosis.

The abdominal surgery is a broad term, which involves the procedures done to treat and diagnose the abdominal illnesses. Both general and regional anaesthesia (epidural or spinal) can be used for lower abdominal procedures. Even though spinal block has less postoperative analgesia and a shorter duration of block, it is still the preferred method due to its superior blocking, quick onset, reduced failure rates, lower risk of infection, and cost-effectiveness.¹

The amount, potency, and dosage of the medication administered determine how much spinal anaesthesia works. In addition to its application to spinal anaesthesia, baricity denotes the relative density of an anaesthetic solution relative to cerebrospinal fluid (CSF).²

The bupivacaine is the commonest anaesthetic agent used in surgery. The FDA granted permission for ropivacaine, an amide local anaesthetic with a high pKa and limited lipid solubility, in 1997; but, since 2009, it has been widely used in India, where it has gained popularity as an intrathecal medication. It may replace bupivacaine as a long-acting local anaesthetic since it has been shown to be less cardiotoxic and to have a significantly higher milligramme threshold for toxicity to the central nervous system (CNS).³

Levobupivacaine is a member of the n-alkyl substituted pipercoloxylidide family of amino-amide local anaesthetics. It is roughly 13 per cent less powerful (by molarity) than racemic bupivacaine. Adverse effects are not expected to occur very often, if at all, when given as prescribed. The potential side effects are primarily linked to improper delivery techniques that could result in systemic exposure and/or toxicity from anaesthesia overexposure. Because the vascularity of tissues affects absorption from the site of administration,

the plasma concentration of levobupivacaine following therapeutic administration varies on both the dose and the route of administration.⁴

Levobupivacaine reduces the risk of cardiotoxicity because it has a higher affinity for plasma proteins and a lower affinity for cardiac sodium channels than the dextro isomer. It has been demonstrated that plain levobupivacaine is isobaric with regard to cerebral fluid. This property makes medication distribution more predictable and lowers the risk of bradycardia and hypotension. In addition, levobupivacaine promotes motor recovery more quickly than racemic bupivacaine. Levobupivacaine is a desirable substitute for racemic bupivacaine in spinal anaesthesia because of these benefits.⁵

This study was undertaken to compare and evaluate the efficacy of 0.5% hyperbaric levobupivacaine versus 0.75% hyperbaric ropivacaine for level, onset, duration of sensory and motor blockade of spinal anaesthesia, haemodynamic changes and safety in American Society of Anesthesiologists (ASA) class I and II geriatric patients undergoing elective infraumbilical surgeries.

MATERIAL AND METHODS

The current comparative study was conducted in Acharya Shri Chander College of Medical Sciences and Hospital, Jammu over a period of one year after obtaining the ethical permission from institutional authorities. A total of 60 geriatric patients who underwent lower abdominal surgical procedures under spinal anaesthesia were included in the study after obtaining the informed consent.

Inclusion Criteria

1. Age group 60-90 years.
2. ASA status I and II.
3. Patients weighing 40-90kg.
4. Patients underwent lower abdominal surgical procedures under spinal anaesthesia.

Exclusion Criteria

1. ASA status III and IV.
 2. Patients with history of bleeding disorder, allergic to local anaesthetics, on anticoagulants, having infection at the site of spinal needle insertion and having spinal abnormalities.
 3. Patients who refused to participate.
- The selected patients were randomly categorized into two groups, i.e. Group A (received 3ml 0.75% hyperbaric Ropivacaine) and Group B (received 3ml 0.5% hyperbaric Levobupivacaine). The following

parameters were studied - haemodynamic parameters: pulse rate, SBP and DBP and arterial oxygen saturation (SpO₂) were measured at baseline and intraoperatively at 0, 2, 5, 10, 15, 20, 25, 30 mins, the onset of sensory block: the time interval between intrathecal administration of the drug and spread of sensory block upto T10; the onset of motor block: the time interval between intrathecal administration of the drug and achievement of Bromage score 3; duration of sensory block; duration of motor block. A clinical proforma was used to collect the data. The collected data was recorded in Microsoft Excel sheet and analysed with the help of SPSS version 22.0.

RESULTS AND OBSERVATIONS

Table 1 Demographic variables

Variables	Group A	Group B	P value
Age in years (mean±SD)	65.2±7.34	62.6±9.81	0.42
Gender	Male	20	0.8
	Female	10	
ASA Status	I	22	0.73
	II	8	
Height in cm (mean±SD)	159.86±3.72	161.7±4.21	0.85
Weight in Kg (mean±SD)	60.86±4.72	61.9±5.1	0.51
Duration of surgery in minutes (mean±SD)	45.90±8.08	48.30±6.22	0.72

Table 1 depicted the demographic variables of patients underwent infra umbilical surgeries. No statistically significant difference was found in demographic variables among both the groups. The mean age of the study subjects in Group A was 65.2±7.34 years and in Group B was 62.6±9.81. Majority of the study subjects were males and male to female ratio was 1.6:1. In both the groups most of the study subjects had ASA status I. The mean height of the study subjects of Group A was 159.86±3.72 cm and of Group B was 161.7±4.21 cm. The mean weight of the study subjects of Group A was 60.86±4.72 kg and of Group B was 61.9±5.1 kg. The mean duration of surgery in Group A was 45.90±8.08 minutes and in Group B was 48.30±6.22 minutes.

Table 2 Pulse rate

Parameters	Group A	Group B	P value
Baseline	80.91±2.21	82.16±0.4	0.37
Intraoperatively (in minutes)	0	78.92±4.28	0.43
	2	84.97±3.22	
	5	82.16±5.4	
	10	84.86±4.42	
	15	84.47±4.56	
	20	84.68±6.54	
	25	82.76±2.1	
	30	85.65±3.4	
Postoperatively (in minutes)	0	80.84±4.65	0.38
	30	78.34±4.81	
	60	84.15±3.12	
	90	80.56±6.53	
	120	83.67±3.52	

Table 2, presented the pulse rate of patients at baseline, intraoperatively (at 0, 2, 5, 10, 15, 20, 25 and 30 minutes) and postoperatively (at 0, 30, 60, 90 and 120 minutes). No statistically significant difference was found in pulse rate of the patients at different time intervals.

Table 3 SBP

Parameters	Group A	Group B	P value
Baseline	139.78±5.6	137.5±4.38	0.2
Intraoperatively (in minutes)	0	135.8±7.4	<0.01
	2	130.6±6.2	
	5	133.3±4	
	10	132.2±5.1	
	15	130.91±3.6	
	20	126.3±6.7	
	25	118.34±2.3	
	30	127.78±5.6	
Postoperatively (in minutes)	0	134.2±2.4	0.21
	30	128.2±8.3	
	60	130.7±6.1	
	90	133.18±4.5	
	120	130.09±7.4	

Table 3, shows the systolic blood pressure of patients at baseline, intraoperatively (at 0, 2, 5, 10, 15, 20, 25 and 30 minutes) and postoperatively (at 0, 30, 60, 90 and 120 minutes). A statistically significant difference was found in systolic blood pressure at baseline and intraoperative period.

Table 4 DBP

Parameters	Group A	Group B	P value
Baseline	78.2±6.2	80.2±3.	0.1
Intraoperatively (in minutes)	0	80.5±3.6	<0.01
	2	79.7±2.2	
	5	82.0±4.3	
	10	76.2±0.2	
	15	74.1±7.5	
	20	70.6±8.9	
	25	68.5±6.9	
	30	79.4±3.1	
Postoperatively (in minutes)	0	81.92±7.5	0.3
	30	80.2±6.2	
	60	78.8±2.5	
	90	76.1±4.7	
	120	80.5±5.3	

Table 4, shows the diastolic blood pressure of patients at baseline, intraoperatively (at 0, 2, 5, 10, 15, 20, 25 and 30 minutes) and postoperatively (at 0, 30, 60, 90 and 120 minutes). A statistically significant difference was found in diastolic blood pressure at baseline and intraoperative period.

Table 5 SpO₂(%)

Parameters	Group A	Group B	P value
Baseline	99.03±1.84	99.3±1.35	0.0
Intraoperatively (in minutes)	0	100	0.54
	2	100	
	5	100	
	10	100	
	15	97.34±3	
	20	96.3±4.7	
	25	97.1±3.0	
	30	98.4±1.9	
Postoperatively (in minutes)	0	99.1±0.5	0.3
	30	99.4±0.2	
	60	99.73±0.43	
	90	99.83±0.46	
	120	99.8±0.48	

Table 5, depicted the saturation of peripheral oxygen (%) at baseline, intraoperatively (at 0, 2, 5, 10, 15, 20, 25 and 30 minutes) and postoperatively (at 0, 30, 60, 90 and 120 minutes). No statistically significant difference was found in saturation of peripheral oxygen (%) at baseline and intraoperative period.

Table 6 Block characteristics

Parameters	Group A	Group B	P value
Onset (time to T10, min)	3.22±2.36	5.76±3.26	0.001
Time to achieve maximum level (min)	6.12±1.24	8.45±2.12	0.030
Duration of sensory block (min)	97.40±12.38	140.33±9.37	0.005
Duration of motor block (min)	126.60±21.22	167.00±3.81	0.002

Table 6 shows the characteristics of anaesthetic blocks. It was found that the mean onset of Onset (time to T10, min) among Group A & B was 3.22±2.36 and 5.76±3.26 minutes. The mean to achieve maximum level (min among Group A & B was 6.12±1.24 and 8.45±2.12 minutes. The mean duration of sensory block among Group A & B was 97.40±12.38 and 140.33±9.37 minutes. The mean duration of motor block among Group A & B was 126.60±21.22 and 167.00±3.81 minutes. There was a statistically significant difference in mean duration of sensory and motor block among both groups.

In our study, subjects who had fall in SBP more than 20% below baseline, they were treated with injection mephenteramine 6mg intravenous bolus. Bradycardia and hypoxia was also noted. Bradycardia was treated with titrated dose of atropine 0.6 mg intravenously and hypoxia was treated with supplemental oxygen via face mask. Nausea, vomiting, dry mouth, dizziness, headache,

respiratory depression and shivering were the other recorded side effects. Nausea was treated in injection ondasterone 0.04 mg/kg-IV and injection tramadol 50mg along with ondasteron 0.04 mg/kg was given intravenously for shivering.

DISCUSSION

The regional anaesthesia (RA) is becoming more and more common now these days. It enhances patient outcomes, postoperative analgesia quality, and reduces complications, particularly in high-risk and elderly patients. This analgesic technique is thought to be the least dangerous in terms of potential problems common with neuraxial block and endotracheal intubation.⁶

In our study the use of 0.5% heavy levobupivacaine and 0.75% heavy ropivacaine for use in spinal anaesthesia in all infra umbilical surgeries in geriatric age group was compared. The mean age of the study subjects in Group A was 65.2±7.34 years and in Group B was 62.6±9.81. Majority of the study subjects were males and male to female ratio was 1.6:1. In both the groups most of the study subjects had ASA status I. The mean height of the study subjects of Group A was 159.86±3.72 cm and of Group B was 161.7±4.21 cm. The mean weight of the study subjects of Group A was 60.86±4.72 kg and of Group B was 61.9±5.1 kg. The mean duration of surgery in Group A was 45.90±8.08 minutes and in Group B was 48.30±6.22 minutes. These findings are correlated with the study performed by Malav K et al. (2018) reported that the mean age of the study subjects was 37.96±13.92 years and 38.54±14.04 years, majority of the patients were males and ASA status I was found in most of the patients. The mean height of the study subjects of Group R was 161.86±3.72cm and of Group L was 161.96±4.16 cm. The mean weight of the study subjects of Group R was 61.08±4.16kg and of Group L was 59.90±4.04kg. The mean duration of surgery in Group R was 47.90±8.08 minutes and in Group L was 49.30±6.22minutes.⁷

A statistically significant difference was found in the block characteristics of both the groups and it was found that 0.75% heavy ropivacaine had more early sensory and motor block. These study outcomes are comparable with the study performed by Kulkarni KR et al. (2014) showing that ropivacaine had more early sensory and motor block.⁸

In current research no statistically, significant difference was found in pulse rate of the patients at different time intervals. Whereas, a statistically significant difference was found in systolic blood pressure, diastolic blood pressure at baseline and intraoperative period, mean duration of sensory and motor block. In our study 20% study subjects had fall in SBP than baseline, bradycardia and hypoxia was also noted. Nausea, vomiting, dry mouth, dizziness, headache, respiratory depression and shivering were the other commonest recorded side effects. In similar study carried out by Mantouvalou M et al. (2008) found that when comparing the onset of motor block between the bupivacaine and levobupivacaine groups, the first group saw a considerably faster onset than the latter ($P < 0.05$). Compared to bupivacaine and levobupivacaine, ropivacaine demonstrated a shorter duration of both motor and sensory block ($P < 0.05$). Bupivacaine needed more commonly the administration of a vasoactive drug (ephedrine) compared to both ropivacaine and levobupivacaine and of a sympathomimetic medicine (atropine) compared to the ropivacaine group.⁷ In other similar study done by Bilal B (2019) observed that low-dose ropivacaine and levobupivacaine have comparable effects and provide a stable and adequate level of anaesthesia. Utilising ropivacaine is advantageous since it reduces the degree of motor obstruction. The common reported complications were additional use of analgesic, drop in heart rate, headache, nausea, itching and back pain.⁹

CONCLUSION

The present study concluded that both the drugs possess comparable effects and provide a stable, adequate level of anaesthesia. Ropivacaine was advantageous, nonetheless, since the motor block's short duration.

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