e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2025; 16(2); 20-33

Original Research Article

To study the incidence of post-operative urinary retention after subarachnoid block using levobupivacaine and ropivacaine

Preeti Lakra[1], R.P. Kaushal[2], Vikas Kumar Gupta[3], Jyotsna Kubre[4], Aditi Mishra[5]

[1]Junior Resident, Department of Anaesthesiology, Gandhi Medical College, Bhopal, M.P.
[2] Head of Department, Department of Anaesthesiology, Gandhi Medical College, Bhopal, M.P.
[3]Associate Professor, Department of Anaesthesiology, Gandhi Medical College, Bhopal, M.P.
[4]Assistant Professor, Department of Anaesthesiology, Gandhi Medical College, Bhopal, M.P.
[5]Junior Resident, Department of Anaesthesiology, Gandhi Medical College, Bhopal, M.P.

Received: 27-12-2024 / Revised: 26-01-2025 / Accepted: 27-02-2025
Corresponding Author: Jyotsna Kubre
Conflict of interest: Nil

Abstract:

Aims and Objectives: The primary objective is to study the incidence of POUR after Spinal Anaesthesia using Levobupivacaine and Ropivacaine. The secondary objectives includes correlation between POUR and modified bromage score and to correlate time to ambulation.

Background: Postoperative urinary retention (POUR), a frequent complication after surgery in which patients cannot urinate despite having a full bladder. POUR is common, with occurrence rates varying from 5% to 70%, depending on the type of surgery. The condition arises from disturbances in the nervous system pathways that regulate bladder function, often due to anesthesia, medications, pain, or the physiological effects of surgery. Bladder overstretching from urine retention can lead to long-term complications like detrusor muscle damage. Although catheterization is a common solution, it carries risks such as infection or trauma. Effective management of POUR involves identifying at-risk patients before surgery, using preventive strategies, and ensuring postoperative care to avoid bladder overdistension.

Materials and Methods: An observational hospital based study was conducted at the Department of anaesthesiology in Gandhi Medical College Bhopal spanning from August 2022 to December 2023. 60 patients were divided into 2 groups. GROUP L-30 patients received 15 mg (3ml) of Hyperbaric Levobupivacaine 0.5% (Total volume-3ml) and GROUP R -30 patients received 22.5 mg (3ml) of Hyperbaric Ropivacaine 0.75% (Total volume-3ml). Incidences of POUR, Bromage scale and time of ambulation was noted postoperatively.

Results: There was no statistically significant difference in demographic data, mean pulse rate, mean diastolic BP between the two groups in this study while sensory regression and motor regression showed variations. The trend showed faster regression of sensory block and motor block in Group R compared to Group L at 5 hours marking and 6 hours marking respectively. the observed differences in POUR incidence between Group L and Group R were not significant. no significant association between intrathecal levobupivacaine and ropivacaine and the severity of POUR.

Conclusion: Comparison between intrathecal Levobupivacaine and intrathecal ropivacaine concluded that Intrathecal Levobupivacaine provides long duration of sensory and motor blockade in lower limb surgeries as compared to intrathecal ropivacaine. Therefore, can be used for anticipated long lower limb orthopaedic surgeries. There was no significant difference in the incidence of POUR between the two groups. Although POUR can depend on various other risk factors like gender, age or presence of BPH.

Keywords: Post operative urinary retention (POUR), Spinal Anesthesia, Levobupivacaine, Ropivacaine, Anesthesia, Spinal, Local anaesthetics.

Introduction

Postoperative urinary retention (POUR) is a common complication that occurs when a patient is unable to urinate after surgery, even though the bladder is full. It can cause significant discomfort or may go unnoticed in some cases. Although POUR often resolves with minimal medical intervention, it can sometimes lead to long-term issues. Prevalence rates in the literature vary widely, ranging from 5% to 70%, indicating that this is a frequent postoperative complication.[1] Healthcare providers must be capable of identifying and managing POUR effectively.

Normal bladder function is controlled by the coordination of the somatic and autonomic nervous systems, which operate in two stages: filling and

voiding. During the filling stage, sympathetic innervation from the thoracolumbar spinal cord (T10 to L2) suppresses the detrusor muscle and activates the bladder base, bladder neck, and urethra through the hypogastric nerves. In the voiding stage, parasympathetic innervation from the pelvic nerves (S2-S4) stimulates the detrusor muscle and relaxes the urethral smooth muscle, while the somatic nervous system, through the pudendal nerve, relaxes the external urethral sphincter, enabling voluntary urination.

Surgical procedures can interfere with this complex signaling system, making POUR a common postoperative complication. Factors such as anesthesia, medications, pain, and tissue damage can disrupt the autonomic nervous system, affecting the ability to urinate. Bladder overfilling, overstretching, and damage to the detrusor muscle can lead to problems such as decreased bladder motility or even atony, especially in older patients. Catheterization itself poses risks like trauma, infection, and stricture formation.[2]

In outpatient general surgery, approximately 3.8% of patients develop POUR.[3] The incidence is higher in outpatient orthopaedic procedures, ranging from 10% to 84%.[4] Colorectal surgery has a POUR incidence of 1% to 52%, while hernia surgery ranges from 5.9% to 38%.[5] Anesthesia also plays a role, as general, spinal, and regional anesthetics can interfere with micturition control. General anesthesia reduces bladder contractility, while spinal and epidural anesthetics disrupt nerve signals that control urination.[2]

Opioids are another significant factor contributing to POUR, as they decrease the sensation of bladder distention and increase bladder outlet obstruction by affecting the parasympathetic and sympathetic systems.[6] Pelvic surgeries can also damage the autonomic nerves responsible for bladder control, further increasing the risk of POUR. Early identification, patient education, and management are crucial in preventing and treating this condition.

Aims and Objectives

1. **Primary:** To study the incidence of POUR (Post Operative Urinary Retention) after Spinal Anaesthesia using Levobupivacaine and Ropivacaine.
2. **Secondary:** to correlate the time of POUR to modified Bromage score and to correlate time to ambulation

Materials And Method

The research was conducted at the Department of Anaesthesiology in Gandhi Medical College and its affiliated hospitals in Bhopal, spanning from August 2022 to December 2023. The study received approval from the Institutional Ethics Committee, and written and informed consent was obtained from all participating patients. Those with a history of clinically significant cardiovascular, pulmonary, hepatic, renal, neurologic, psychiatric, or metabolic diseases were excluded from the research following a thorough pre-anaesthetic examination and investigations.

Study Design: An observational hospital based study.

Inclusion Criteria:

- Patients with ASA grade - I and ASA grade - II
- Age group 18-60 years of either sex.
- All patients going for lower limb and lower abdominal surgeries.

Exclusion Criteria:

- Patient refusal or not giving consent.
- Patients with Neurological disease.
- Spine/Neurological deformities.
- Local Skin infections or disease.
- Patients with bleeding diathesis.
- History of drug allergy.
- Coagulopathy disorders.
- Patients on tranquilizers, hypnotics, sedatives and other psychotropic drugs.
- Severe liver or kidney diseases.
- ASA grade III and more than III

Material Required:

- Spinal needle 25G
- 2ml and 5ml disposable syringes
- Lignocaine 2% vial for local infiltration
- All equipment and drugs necessary for resuscitation were kept ready like emergency drugs, cardio, pulmonary resuscitated, equipment, oxygen sources et cetera
- Drugs to be injected – Levobupivacaine 0.5% heavy and Ropivacaine 0.75% heavy.

Data Collection and Methodology: After selection of the cases on the basis of inclusion, criteria data was collected on an individual basis by filling of the Performa attached.

Pre-Anaesthetic Visit: During the pre-anaesthetic visit, a comprehensive preanesthetic check-up was conducted. All patients were individually seen the day prior to their scheduled surgery, and a detailed explanation of the subarachnoid block procedure was provided, accompanied by the collection of written informed consent. The patients' weight (in kilograms) was recorded. An extensive assessment of the airway and spine, along with a thorough general and systematic examination, was performed. Additionally, preoperative investigations including complete hemogram (CBC), renal function tests (RFT), random blood sugar, blood grouping and

typing, coagulation profile, electrocardiography, and chest X-ray were meticulously evaluated.

On the evening preceding the surgery, all patients received pre-medication consisting of tablet ranitidine 150mg, tablet metoclopramide 10mg, and tablet alprazolam 0.5mg. Additionally, clear instructions were given to all patients to observe an overnight fasting period prior to the scheduled surgery.

The patients were given the study groups as follows –

i) **Group L** – 30 patients received 15 mg (3ml) of Hyperbaric Levobupivacaine 0.5% (Total volume – 3ml)
ii) **Group R** – 30 patients received 22.5 mg (3ml) of Hyperbaric Ropivacaine 0.75% (Total volume – 3ml)

Before the spinal injection, a distinct resident anaesthetist, uninvolved with the patient thereafter, loaded the study drug. Consequently, the anaesthetist overseeing the case remained unaware of the specific solution administered to the patient.

Methodology

In the operating room, the patient was instructed to observe a fasting period of 6 hours. Intravenous access was established using an 18-gauge cannula, and a preload of Ringer Lactate solution at a rate of 10-15 ml/kg of body weight was administered over a span of 20-25 minutes before the subarachnoid block. Each patient received 8 mg of ondansetron. Oxygen was administered via a facemask as required during both the anaesthesia and the surgery. Baseline non-invasive arterial pressure, pulse rate, saturation, and continuous ECG monitoring were initiated for the patient.

TECHNIQUE - The technique involved placing the patient in a left lateral or sitting position, followed by cleaning and draping the skin. Local infiltration at the L3-4 interspace with 2% lidocaine (2 ml) was performed, and the subarachnoid space was accessed using a 25-gauge Quincke-type spinal needle. The study solution was injected at a rate of 0.2 ml/sec, with CSF aspiration at the beginning and end of the injection to confirm the needle's position once a free flow of cerebrospinal fluid was identified.

Administration Of Spinal Anaesthesia

Following the completion of the spinal injection, all patients underwent continuous monitoring for the following parameters:

1. Baseline (preoperative) heart rate and saturation, at 5 minutes post-injection, and subsequently every 15 minutes. Instances of bradycardia were addressed with intravenous administration of 0.6 mg atropine. Respiratory depression was characterized by a respiratory rate below 8 breaths per minute or a peripheral oxygen saturation (SpO2) less than 94% on room air, and it was managed through oxygen supplementation.
2. Continuous ECG monitoring done till the end of the surgery.
3. Non-invasive arterial blood pressure was taken at baseline ,then after every 5 min until completion of surgery. If systolic blood pressure decreased by 20% from baseline or if the patient complained of symptoms indicative of incipient hypotension, I.V mephenteramine was administered in increments of 6mg as required.

Sensory Blockade: The initiation of the sensory block was determined as the time interval from the completion of the anaesthetic injection to the point at which there was a loss of sensation to pinprick at T10 level. The assessment of sensory block involved the use of a 27-gauge hypodermic needle to perform the pinprick method in the mid-clavicular line. This assessment was conducted every minute until the block extended to the T6 dermatome. Subsequently, the level was examined every 2 minutes until the maximum sensory block was achieved.

Grades of Sensory Block

GRADE 0 – Sharp pain is felt
GRADE 1 – Analgesia, dull sensation is felt
GRADE 2 – Anaesthesia, no sensation is felt

Motor Blockade: Onset of complete motor blockade was defined as the time interval taken between the completion of study during injection until Bromage 3 was registered.

Motor blockade was assessed for both legs with four points Modified Bromage scale

Modified Bromage Scale

Score	Criteria
1	Complete block (unable to move feet or knees)
2	Almost complete block (able to move feet only)
3	Partial block (just able to move knees)
4	Detectable weakness of hip flexion while supine (Full flexion of knees)
5	No detectable weakness of hip flexion while supine
6	Able to perform partial knee bend.

The surgery commenced once complete anaesthesia was achieved. Upon completion of the surgery, both sensory and motor levels were documented. The time taken for a two-segment regression from the maximal level was also recorded. Postoperatively, patients were routinely followed up and monitored in the recovery and postoperative ward.

Three methods have been used to diagnose POUR (Post operative urinary retention) :

1) History and physical examination
2) The need for bladder catheterization
3) Ultrasonographic assessment

Three criteria will be used to diagnose POUR:

1) Inability to void urine for >12 hours after induction of anaesthesia
2) The need for Bladder catheterization
3) Ultrasonographic assessment – Inability to void with a bladder volume >500ml in 12 hours

Presence of anyone of the above criteria will confirm POUR.

Urinary Retention graded as follows:

1) 0=none
2) 1=mild hesitancy
3) 2=straight catheter required
4) 3= Foley's catheter required

Other complications occurring in both the groups were noted for which included-

1) Hypotension
2) Hypoxia
3) Bradycardia
4) Nausea/vomiting
5) Restless
6) Shivering
7) Pruritis
8) Surgical complications

Observations: Perioperatively following parameters were observed in the conducted study

1) The time of onset and duration of anaesthesia after single shot intrathecal dose of drug
2) Haemodynamic parameters of heart rate, systolic and diastolic blood pressure and peripheral oxygen saturation were recorded at 5min, 10 mins, 15 mins, 20 mins, 40 mins, 80 mins, 100 mins, 120 mins, 140 mins, 160 mins and 180 mins
3) The level of sensory block (assessed by pin prick) and motor block (assessed by modified Bromage scale)
4) Incidences of POUR (Post operative urinary retention) was recorded.

Post-operatively, following parameters were observed in the conducted study

1) Sensory level and motor block was assessed every hour till complete recovery.
2) Post-operative urinary retention was recorded.
3) If POUR was present, then grade of POUR was recorded.

Results

Table 1: Distribution according to study group

Groups	Different doses	No. of cases
Group L	Received 15 mg (3ml) of Hyperbaric Levobupivacaine 0.5% (Total volume – 3ml)	30(50.00%)
Group R	Received 22.5 mg (3ml) of Hyperbaric Ropivacaine 0.75% (Total volume – 3ml)	30(50.00%)

A prospective observational comparative study was conducted at the Department of Anaesthesiology in Gandhi Medical College and affiliated hospitals in Bhopal. The study aimed to investigate the incidence of Post-Operative Urinary Retention (POUR) after spinal anaesthesia in patients undergoing lower limb and lower abdominal surgeries. Two groups were compared: Group L, consisting of 30 patients who received 15 mg (3ml) of Hyperbaric Levobupivacaine 0.5% for spinal anaesthesia, and Group R, comprising 30 patients who received 22.5 mg (3ml) of Hyperbaric Ropivacaine 0.75%. The study aimed to determine the frequency of POUR in each group and ensure a balanced comparison between the two anaesthesia agents

Table 2: Age-wise distribution between the groups

Age (years)	Groups				Total	
	Group L		Group R			
	No.	%	No.	%	No.	%
≤ 20 years	1	3.3%	3	10.0%	4	6.7%
21-30 years	12	40.0%	7	23.3%	19	31.7%
31-40 years	10	33.3%	5	16.7%	15	25.0%
41-50 years	4	13.3%	8	26.7%	12	20.0%
51-60 years	3	10.0%	7	23.3%	10	16.7%
Total	30	100.0%	30	100.0%	60	100.0%
Mean age (±SD)	34.63±10.24		39.07±12.37		36.85±11.48	

Unpaired 't' test applied. P value = 0.136, Not Significant

The above table shows the age distribution for Group R and Group L.

In Group L, the largest proportion of patients (40.0%) were aged between 21-30 years, followed by the age group of 31-40 years, which consisted of 33.3% of the patients. In comparison, in Group R, the majority of patients (26.7%) were aged between 41-50 years, followed by the age group of 21-30 years, which consisted of 23.3% of the patients. The average age of patients in Group L was 34.63 years with a standard deviation of ±10.24, while for Group R, it was 39.07 years with a standard deviation of ±12.37.

The statistical analysis results utilizing the unpaired t-test indicated a P value of 0.136, which suggests no statistically significant difference in age distribution between the two groups (P > 0.05), indicating that both groups exhibit comparable age distribution.

Table 3: Gender-wise distribution between the groups

Gender	Groups				Total	
	Group L		Group R			
	No.	%	No.	%	No.	%
Male	25	83.3%	19	63.3%	44	73.3%
Female	5	16.7%	11	36.7%	16	26.7%
Total	30	100.0%	30	100.0%	60	100.0%

Pearson Chi-Square = 3.068, p value = .080, Not Significant

The above table shows the gender distribution for Group L and Group R.

In Group L, the majority of patients were male, accounting for 83.3% of the group, while females accounted for 16.7%. On the other hand, in Group R, males comprised 63.3% of the patients, with females comprising 36.7%. The total number and percentage of patients in each group were tabulated, resulting in 60 patients in the study. The statistical analysis results using the chi-square test showed a P value of .080, indicating no significant difference in gender distribution between the two groups (P > 0.05). Therefore, it can be concluded that both groups have a comparable gender distribution.

Table 4: Weight-wise distribution between the groups

Group	Number of Cases	Weight (kg) [Mean ± SD]	T value	P value
Group L	30	59.1±9.61	-1.714, df = 58	0.092
Group R	30	62.93±7.6		
Total	60	61.02±8.8		

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The above table shows the weight-wise distribution for Group L and Group R.

There are 30 cases in Group L, and their average weight is 59.1 kg, with a standard deviation of 9.61 kg. In Group R, there are also 30 cases, and their average weight is slightly higher at 62.93 kg, with a standard deviation of 7.6 kg. When we combine the data for both groups, which totals 60 cases, the average weight is 61.02 kg, with a standard deviation of 8.8 kg. According to the statistical analysis using the unpaired t-test, the p-value is 0.092, which means that there is no significant difference in weight distribution between the two groups (P > 0.05). This confirms that both groups have a comparable weight distribution.

Table 5: Duration of Surgery between the groups

Duration of Surgery (minutes)	Groups				Total	
	Group L		Group R			
	No.	%	No.	%	No.	%
60 minutes	3	10.0%	5	16.7%	8	13.3%
90 minutes	4	13.3%	4	13.3%	8	13.3%
100 minutes	3	10.0%	3	10.0%	6	10.0%
120 minutes	11	36.7%	6	20.0%	17	28.3%
150 minutes	5	16.7%	9	30.0%	14	23.3%
180 minutes	4	13.3%	3	10.0%	7	11.7%
Total	30	100.0%	30	100.0%	60	100.0%
Mean (±SD)	34.63±10.24		39.07±12.37		36.85±11.48	
T value	0.214, df = 58					
P value	0.831					

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The table shows the duration of surgeries for two groups, Group L and Group R, each consisting of 30 cases. The table divides the duration of surgeries into different time intervals, ranging from 60 to 180 minutes, allowing for a comprehensive assessment of procedural timelines within each treatment group.

In Group L, the most common surgery duration was 120 minutes, accounting for 36.7% of all procedures. This suggests that many surgeries in this group adhered to a standard surgical duration. However, notable proportions of surgeries lasted 150 minutes (16.7%) and 180 minutes (13.3%), indicating that procedural length varied across different patients.

In contrast, Group R had a higher proportion of procedures lasting 150 minutes (30.0%) compared to Group L. However, most surgeries also fell within the 120-minute duration category (20.0%). This difference in the distribution of surgical durations may imply differences in the complexity of surgeries or procedural requirements between patients who received Ropivacaine and Levobupivacaine.

Overall, the combined data across both groups underscores a diverse range of surgical durations, with 120 minutes being the most frequently observed duration. Statistical analysis using an unpaired t-test yielded a P value of 0.831, suggesting no statistically significant difference in the duration of surgery between the two groups. This indicates that Group L and Group R surgeries exhibited comparable mean durations.

Table 6: Comparison of Mean Heart Rate between the groups

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
Baseline	94.8±16.64	94.2±15.24	0.145, df=58	0.884
Immediately after induction	93.73±16.58	94.93±15.01	-0.29, df=58	0.769
After 5 min	93.4±15.01	95.2±14.75	-0.46, df=58	0.641
After 10 min	90.53±15.37	91.93±14.7	-0.36, df=58	0.719
After 15 min	88.33±15.07	89±14.27	-0.17, df=58	0.860
After 20 min	86.07±13.86	85.73±13.18	0.095, df=58	0.924
After 40 min	83.4±12.92	82.53±12.54	0.263, df=58	0.792
After 60 min	81.07±12.07	79.73±10.89	0.449, df=58	0.654
After 80 min	82.15±11.33	79.6±10.18	0.894, df=55	0.374
After 100 min	81.33±10.59	77.73±10.25	1.263, df=52	0.211
After 120 min	81.3±10.51	77.22±9.23	1.411, df=45	0.164
After 150 min	82.44±13.78	75.42±7.33	1.907, df=31	0.065
After 180 min	81±6.22	75±6.93	1.574, df=18	0.132

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The table compares the mean heart rate between Group L and Group R at different time intervals following the administration of spinal anaesthesia using Levobupivacaine and Ropivacaine. The table provides insights into the fluctuations in heart rate over time within each treatment group and the comparison between the two groups. At baseline, there is a slight difference in mean heart rate between Group L (94.8 bpm) and Group R (94.2 bpm). However, this difference is not statistically significant ($p = 0.884$). Similarly, no significant differences are observed in mean heart rate immediately after induction and at subsequent intervals up to 180 minutes post-administration of spinal anaesthesia.

Throughout the monitoring period, mean heart rates exhibit fluctuations within each group, reflecting the dynamic physiological responses to anaesthesia and surgical procedures. However, these fluctuations do not demonstrate consistent patterns or significant disparities between Group L and Group R.

Statistical analysis using unpaired t-tests confirms the absence of statistically significant differences in mean heart rate between the two groups at all time intervals ($p>0.05$). This suggests that the choice of anaesthesia agent, whether Levobupivacaine or Ropivacaine, does not significantly influence heart rate dynamics during the perioperative period.

Overall, the findings indicate that both Levobupivacaine and Ropivacaine are associated with similar cardiovascular effects in patients undergoing spinal anaesthesia for lower limb and lower abdominal surgeries.

Table 7: Comparison of Systolic Blood Pressure between the groups

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
Baseline	123.4±10.53	126.33±13.87	0.922, df=58	0.360
Immediately after induction	120.7±8.71	123.8±11.61	1.169, df=58	0.246
After 5 min	110.8±7.29	114.53±9.28	1.733, df=58	0.088
After 10 min	107.67±5.87	110.27±7.73	1.466, df=58	0.147
After 15 min	105.93±5.29	108±7.03	1.286, df=58	0.203
After 20 min	103.8±4.71	105.8±6.44	1.373, df=58	0.174
After 40 min	103.67±3.77	105.8±5.57	1.714, df=58	0.092
After 60 min	106.07±5	107.13±4.83	0.840, df=58	0.404
After 80 min	105.93±4.74	106±4.61	0.053, df=55	0.957
After 100 min	112.67±4.05	110.52±4.10	-1.90, df=51	0.063
After 120 min	117.78±4.05	116±4.77	-1.37, df=45	0.174
After 150 min	121.17±4.25	119.78±7.1	-0.69, df=31	0.494
After 180 min	123.25±4.67	123±2.58	-0.10, df=18	0.919

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The table compares systolic blood pressure between Group L and Group R at various time intervals, encompassing baseline, drug administration, and several post-operative periods, following the administration of spinal anaesthesia using Levobupivacaine and Ropivacaine. This comparison allows for an assessment of the effects of these anaesthesia agents on systolic blood pressure dynamics during the perioperative period.

At baseline, the mean systolic blood pressure is slightly higher in Group L (126.33 mmHg) compared to Group R (123.4 mmHg), but this difference is not statistically significant ($p = 0.360$). Similarly, no significant differences are observed immediately after induction and at subsequent intervals up to 180 minutes post-administration of spinal anaesthesia.

Throughout the monitoring period, both Group L and Group R exhibit fluctuations in systolic blood pressure, reflecting the physiological responses to anaesthesia and surgical procedures. However, these fluctuations do not demonstrate consistent patterns or significant disparities between the two groups.

Statistical analysis using unpaired t-tests confirms the absence of statistically significant differences in mean systolic blood pressure between Group L and Group R at all time intervals ($p > 0.05$). This suggests that the choice of anaesthesia agent, whether Levobupivacaine or Ropivacaine, does not significantly influence systolic blood pressure dynamics during the perioperative period.

Overall, the findings indicate that Levobupivacaine and Ropivacaine are associated with similar effects on systolic blood pressure in patients undergoing spinal anaesthesia for lower limb and lower abdominal surgeries.

Table 8: Comparison of Diastolic blood pressures between the groups

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
Baseline	80.2±7.73	79.8±8.52	-0.19, df=58	0.849
Immediately after induction	80.2±7.73	79.8±8.52	-0.19, df=58	0.849
After 5 min	74.67±7.49	75±8.18	0.164,df=58	0.869
After 10 min	72.67±6.99	72.53±7.41	-0.07, df=58	0.943
After 15 min	71.93±6.34	70.07±7.23	-1.06, df=58	0.291
After 20 min	70.07±6.18	68.2±7.27	-1.07, df=58	0.288
After 40 min	67.8±5.95	66.27±7.35	-0.88, df=58	0.378
After 60 min	65.13±5.58	65.13±6.62	0, df=58	1.000
After 80 min	64.93±5.45	64.81±6.73	-0.07, df=55	0.941
After 100 min	68.13±4.95	67.30±6.94	-0.50, df=51	0.614
After 120 min	70.59±4.25	69.5±5.94	-0.73, df=45	0.465
After 150 min	77.42±4.77	72.22±4.84	-2.77, df=31	0.009*
After 180 min	79±5.32	72±3.65	-2.46, df=18	0.023*

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The above table compares diastolic blood pressures between Group L and Group R at various time intervals following the administration of spinal anaesthesia using Levobupivacaine and Ropivacaine.

At baseline and immediately after induction, there were no statistically significant differences in DBP between the two groups, indicating similar baseline hemodynamic profiles and initial responses to anaesthesia induction. This suggests that both Levobupivacaine and Ropivacaine have comparable effects on diastolic blood pressure during the early stages of anaesthesia administration.

Throughout the subsequent time intervals (5 to 60 minutes), both groups experienced minor fluctuations in DBP. However, these variations were not statistically significant, suggesting that the choice between Levobupivacaine and Ropivacaine did not significantly impact diastolic blood pressure within the first hour after spinal anaesthesia administration.

Beyond the 60-minute mark, particularly at 150 and 180 minutes, notable differences emerged. Group R (Ropivacaine) consistently displayed higher diastolic blood pressure values than Group L (Levobupivacaine). These differences were statistically significant, indicating that patients receiving Ropivacaine experienced higher diastolic blood pressures than those receiving Levobupivacaine during the later stages of anaesthesia.

These findings suggest that the choice of local anaesthetic agent may have implications for hemodynamic stability during the post-operative period, with Ropivacaine potentially exerting a greater influence on diastolic blood pressure than Levobupivacaine.

Table 9: Comparison of Mean Arterial Pressures between the groups

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
Baseline	94.6±6.59	95.31±8.94	0.350, df=58	0.727
Immediately after induction	93.7±6.57	94.47±8.09	0.403, df=58	0.688
After 5 min	86.71±5.71	88.18±7.21	0.873, df=58	0.385
After 10 min	84.33±4.95	85.11±6.44	0.524, df=58	0.601
After 15 min	83.27±4.89	82.71±6.1	-0.38, df=58	0.698
After 20 min	81.31±4.55	80.73±6.08	-0.41, df=58	0.678
After 40 min	79.44±4.43	79.44±5.88	-1.05, df=58	1.000
After 60 min	78.78±4.51	79.13±5.06	0.287, df=58	0.774
After 80 min	78.6±4.52	78.54±4.64	-0.04, df=55	0.962
After 100 min	82.98±3.73	81.51±4.56	-1.290,df=51	0.203
After 120 min	86.32±3.14	85±4.39	-1.20, df=45	0.234
After 150 min	92±3.72	88.07±3.95	-2.65, df=31	0.012
After 180 min	93.75±3.67	89±2.21	-2.45, df=18	0.024

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The above table compares mean arterial pressures (MAP) between Group L and Group R at various time intervals following the administration of spinal anaesthesia using Levobupivacaine and Ropivacaine.

The analysis revealed no statistically significant differences in mean arterial pressures between Group L and Group R at baseline and immediately after induction, as well as during the initial 20 minutes post-induction. Both groups exhibited similar MAP levels during these intervals, indicating comparable hemodynamic responses to anaesthesia induction.

Furthermore, no significant differences were observed in mean arterial pressures between the two groups at 40 minutes, 60 minutes, and 80 minutes post-induction, suggesting consistent hemodynamic stability during the early phases of surgery.

After 80 minutes, the two groups showed noticeable differences in mean arterial pressure (MAP). At 150 and 180 minutes after administration, the mean MAP of Group L was significantly different from that of Group R ($p < 0.05$). This suggests that the hemodynamic responses to Levobupivacaine and Ropivacaine may differ as the duration of anaesthesia progresses.

Table 10: Comparison of SPO2 between the groups

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
Baseline	99.33±0.61	99.5±0.57	-1.09, df=58	0.278
Immediately after induction	99.33±0.61	99.53±0.51	-1.38, df=58	0.171
After 5 min	100±0.00	100±0.00	-1.38, df=58	0.171
After 10 min	99.33±0.61	99.53±0.51	-1.38, df=58	0.171
After 15 min	99.33±0.61	99.53±0.51	-1.38, df=58	0.171
After 20 min	99.33±0.61	99.53±0.51	-1.38, df=58	0.171
After 40 min	99.33±0.61	99.53±0.51	-1.38, df=58	0.171
After 60 min	99.33±0.61	99.53±0.51	-1.08, df=55	0.284
After 80 min	99.37±0.63	99.53±0.51	-1.14, df=52	0.256
After 100 min	99.43±.66	99.53±0.51	-0.614,df=51	0.542
After 120 min	99.45±0.69	99.59±0.5	-0.35, df=31	0.726
After 150 min	99.56±0.53	99.63±0.49	-1.09, df=18	0.287
After 180 min	99.25±0.5	99.50±0.51	-.871, df=18	0.395

Unpaired 't' test applied. P value <0.05 was considered statistically significant.

The table outlines the comparison of oxygen saturation (SPO2) levels between Group L and Group R at various time intervals, from baseline to different post-operative periods.

At baseline and immediately after induction, there were no significant differences in SPO2 between Group L and Group R, indicating comparable oxygen saturation levels at the beginning of the anaesthesia procedure. This suggests that both Levobupivacaine and Ropivacaine had similar effects on peripheral oxygen saturation during the initial stages of anaesthesia administration.

Throughout the subsequent time intervals (5 to 120 minutes), both groups maintained consistent SPO2 levels without significant differences. This implies that the choice between Levobupivacaine and Ropivacaine did not significantly impact peripheral oxygen saturation during the majority of the observation period.

At 150 and 180 minutes post-anesthesia administration, there were slight differences in SPO2 between the two groups, but these variances were not statistically significant. Both groups maintained adequate oxygenation levels, with no significant differences in peripheral oxygen saturation.

Table 11: Comparison of Sensory Block Regression with Levobupivacaine and Ropivacaine

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
1 hour	2±0.00	2±0.00	-	-
2 hours	2±0.00	2±0.00	-	-
3 hours	1.43±0.5	1.43±0.5	0, df=58	1.000
4 hours	1±0.00	0.73±0.45	3.247, df=58	0.001
5 hours	0.3±0.47	0.23±0.43	0.575, df=58	0.567
6 hours	0.00±0.00	0.00±0.00	-	-
7 hours	0.00±0.00	0.00±0.00	-	-
8 hours	0.00±0.00	0.00±0.00	-	-

The above table compares the sensory block regression after spinal anaesthesia using Levobupivacaine (Group L) and Ropivacaine (Group R). The sensory block regression of each group was evaluated at various time intervals after administering the anaesthetic agents. Group L and Group R exhibited similar mean sensory block levels at one and two hours after the administration, indicating consistent anaesthesia effects during the initial phases. However, at the three-hour mark, the mean sensory block level remained almost identical between the two groups, with a mean value of 1.43 ± 0.5, demonstrating no significant difference ($p = 1.000$). The difference in sensory block regression became apparent at the four-hour mark, with Group L displaying a mean value of 1, while Group R exhibited a lower mean value of 0.73 ± 0.45 ($p = 0.001$). This discrepancy suggests a faster regression of sensory block in Group R compared to Group L at this time. The trend continued at the five-hour mark but with a smaller difference between the two groups, with Group L at 0.3 ± 0.47 and Group R at 0.23 ± 0.43 ($p = 0.567$), indicating a gradual convergence in sensory block regression as time

progressed. Beyond the five-hour mark, both groups demonstrated complete regression of sensory block, with mean values of 0.00 ± 0.00 across all subsequent time intervals. This complete regression indicates the return of sensation in the dermatomes affected by spinal anaesthesia, highlighting the temporary nature of the anaesthetic effect.

Table 12: Comparison of Motor Block Regression with Levobupivacaine and Ropivacaine

Time Intervals	Group L [Mean ± SD]	Group R [Mean ± SD]	T value	P value
1 hour	1.00±0.00	1.00±0.00	-	-
2 hours	1.33±0.48	1.03±0.18	-3.20, df=58	0.002
3 hours	1.9±0.66	1.5±0.51	-2.62, df=58	0.011
4 hours	2.6±0.5	2.37±0.49	-1.82, df=58	0.072
5 hours	3.8±0.00	4.00±0.41	2.692, df=58	0.009
6 hours	5.00±0.00	5.00±0.00	-	-
7 hours	6.00±0.00	6.00±0.00	-	-
8 hours	6.00±0.00	6.00±0.00	-	-

The above table compares the regression of motor block in two groups that were given different local anaesthetics, Levobupivacaine (Group L) and Ropivacaine (Group R), at different time intervals after subarachnoid block.

During the initial time intervals of 1 and 2 hours, both groups showed a similar regression of motor block, with mean scores of 1.00 in Group L and 1.00 in Group R at 1 hour, 1.03 in Group L and 1.33 in Group R at 2 hours. However, differences started to appear at later time points.

At 3 hours after administration, Group R had a slightly higher mean score of 1.9, while Group L had a mean motor block score of 1.5. This difference was statistically significant, indicating that motor block regression was slower in Group R compared to Group L.

By 4 hours, the difference between the two groups became more apparent. Group L exhibited further regression with a mean score of 2.37, while Group R showed a higher mean score of 2.6. Although the difference was not statistically significant, the trend suggests a slower regression in Group R.

At 5 hours, Group L had a complete regression of motor block, with a mean score of 4.00, while Group R still showed some residual block with a mean score of 3.8. This disparity was statistically significant, reaffirming the slower regression of motor block in Group R compared to Group L.

From 6 to 8 hours, both groups reached complete regression, as indicated by mean scores of 5.00 or 6.00, with no significant difference observed between the groups.

These findings suggest that the regression of motor block following subarachnoid block with Ropivacaine tends to be slower than Levobupivacaine, particularly during the initial hours post-administration.

Table 13: Comparison of Post-Operative Urinary Retention (POUR) Incidence between Group L and Group R

	Groups				Total	
	Group L		Group R			
	No.	%	No.	%	No.	%
Absent	25	83.3%	25	83.3%	50	83.3%
Present	5	16.7%	5	16.7%	10	16.7%
Total	30	100.0%	30	100.0%	60	100.0%

Pearson Chi-Square = .000, p value = 1.000, Not Significant

The above table shows the incidence of Post-Operative Urinary Retention (POUR) in two groups, Group L and Group R, after subarachnoid block. POUR is classified as either Absent or Present, with the corresponding counts and percentages for each group and the total across both groups. In Group L, out of 30 patients, 25 patients (83.3%) did not experience POUR, while five patients (16.7%) did. Similarly, in Group R, out of 30 patients, 25 patients (83.3%) did not experience POUR, and five patients (16.7%) did. When considering the total number of patients across both groups (60), 50 patients (83.3%) did not experience POUR, while ten patients (16.7%) did. The statistical analysis, calculated using Pearson Chi-Square, resulted in a value of 0.000 with a p-value of 1.000. This indicates that the observed differences in POUR incidence between Group L and Group R were not significant. Based on

this analysis, we can conclude that there is no significant difference in the incidence of POUR between the two groups.

Table 14: Comparison of Post-Operative Urinary Retention (POUR) Grades between Group L and Group R

Grade	Groups				Total	
	Group L		Group R			
	No.	%	No.	%	No.	%
0	25	83.3%	25	83.3%	50	83.3%
1	2	6.7%	1	3.3%	3	5.0%
2	3	10.0%	4	13.3%	7	11.7%
Total	30	100.0%	30	100.0%	60	100.0%

Pearson Chi-Square = 0.476, p value = 0.788, Not Significant

The above table shows the distribution of post-operative urinary retention (POUR) grades in Group L and Group R and the overall totals. POUR is classified based on severity, with Grade 0 indicating no urinary retention, Grade 1 indicating mild hesitancy, and Grade 2 requiring straight catheterization. The table indicates that 83.3% of patients in Group L had Grade 0 POUR, while 6.7% had Grade 1 and 10.0% had Grade 2. Similarly, in Group R, 83.3% had Grade 0, 3.3% had Grade 1, and 13.3% had Grade 2 POUR. Overall, most patients in both groups had Grade 0 POUR, and only a small percentage had higher grades of urinary retention. The Pearson Chi-Square test statistical analysis shows that the observed differences in POUR grades between Group L and Group R were not statistically significant (p-value = 0.788). This indicates no significant association between the type of anaesthetic used (Levobupivacaine or Ropivacaine) and the severity of POUR.

Results

There are 30 cases in Group L, and their average weight is 59.1 kg, with a standard deviation of 9.61 kg. According to the statistical analysis using the unpaired t-test, the p-value is 0.092, which means that there is no significant difference in weight distribution between the two groups ($P > 0.05$). This confirms that both groups have a comparable weight distribution.

Overall, the combined data across both groups underscores a diverse range of surgical durations, with 120 minutes being the most frequently observed duration. Statistical analysis using an unpaired t-test yielded a P value of 0.831, suggesting no statistically significant difference in the duration of surgery between the two groups. Findings of our study was similar to K Lingaraj et al[7] where patient's age and duration of surgery were not significantly associated with urinary retention but his study showed that patient's gender was significantly associated with urinary retention. WKM Kieffer et al[8] concluded in his study that relation between IPSS (International Prostate symptom score seen in males) and rate of pour is significant.

At baseline, the mean systolic blood pressure is slightly higher in Group L (126.33 mmHg) compared to Group R (123.4 mmHg), but this difference is not statistically significant ($p = 0.360$). Similarly, no significant differences are observed immediately after induction and at subsequent intervals up to 180 minutes post-administration of spinal anaesthesia. Statistical analysis using unpaired t-tests confirms the absence of statistically significant differences in mean systolic blood pressure between Group L and Group R at all time intervals ($p > 0.05$). This suggests that the choice of anaesthesia agent, whether Levobupivacaine or Ropivacaine, does not significantly influence systolic blood pressure dynamics during the perioperative period. Our study showed that there is increased baseline systolic blood pressure in levobupivacaine group as compared to ropivacaine group initially but no significant differences were seen later on but Dinesh Govindarao et al[9] reported stable haemodynamic in both the groups. Spinal anaesthesia was given with 3ml Levobupivacaine 0.5% (15 mg) to patients in Group L and with 3ml Ropivacaine 0.5% (15 mg) to patients in Group R in his study while in our study, Hyperbaric levobupivacaine 15mg 0.5% and ropivacaine 0.75% 22.5 mg was used.

Manazir Athar et al[10] conducted a study where he included 60 patients undergoing lower limb orthopaedic surgery under spinal anaesthesia where randomly given either 15mg levobupivacaine 0.5% (3ml) or 22.5mg ropivacaine 0.75% (3ml). Mean arterial pressure decreased significantly in both groups in hi study compared to baseline but overall hypotension was not significant.

The sensory block regression of each group was evaluated at various time intervals after administering the anaesthetic agents. Group L and Group R exhibited similar mean sensory block levels at one and two hours after the administration, indicating consistent anaesthesia effects during the initial phases. However, at the three-hour mark, the mean sensory block level remained almost identical between the

two groups, with a mean value of 1.43 ± 0.5, demonstrating no significant difference (p = 1.000). The difference in sensory block regression became apparent at the four-hour mark, with Group L displaying a mean value of 1, while Group R exhibited a lower mean value of 0.73 ± 0.45 (p = 0.001). This discrepancy suggests a faster regression of sensory block in Group R compared to Group L at this time. The trend continued at the five-hour mark but with a smaller difference between the two groups, with Group L at 0.3 ± 0.47 and Group R at 0.23 ± 0.43 (p = 0.567), indicating a gradual convergence in sensory block regression as time progressed. Beyond the five-hour mark, both groups demonstrated complete regression of sensory block, with mean values of 0.00 ± 0.00 across all subsequent time intervals. Our study was similar to the following studies done. P E Gautier et al[11] reported that Intrathecal ropivacaine 10 mg produced shorter sensory anaesthesia and motor blockade than bupivacaine 8mg. Patients were randomly assigned to receive 4 ml of one of five isobaric intrathecal solutions: Patients in group 1 received 8 mg of bupivacaine; patients in group 2 received 8 mg ropivacaine; patients in group 3 received 10 mg ropivacaine; patients in group 4 received 12 mg ropivacaine; and patients in group 5 received 14 mg ropivacaine. Ropivacaine 14 mg produced sensory block comparable to ropivacaine 12 mg. Neval Boztug et al[12] concluded in his study that Isobaric ropivacaine 15 mg provided a higher sensory block level and shorter sensorial onset and offset times than did 7.5 mg of isobaric bupivacaine. Our study included hyperbaric drugs whereas their study included isobaric intrathecal drugs although volume of drug used was same that is 3ml. J. F Luck et al[13] did a study where he used 3ml of hyperbaric ropivacaine, levobupivacaine and bupivacaine for spinal anaesthesia. His study showed that regression of sensory block in the ropivacaine group was notably more rapid as compared levobupivacaine and bupivacaine groups. There were no significant differences between the bupivacaine and the levobupivacaine groups.

Our study showed initiation of regression of sensory effect by 180 mins and Complete regression was seen at 360 mins while initiation of regression of sensory effect in J. F Luck et al[13] study was by 60 min. Complete regression was seen at 120 mins. This difference is seen probably due to drug composition used for spinal anaesthesia. His study included hyperbaric drugs consisting of glucose 30mg while our drug included 80mg of glucose making it more hyperbaric.

During the initial time intervals of 1 and 2 hours, both groups showed a similar regression of motor block, with mean scores of 1.00 in Group L and 1.00 in Group R at 1 hour, 1.03 in Group L and 1.33 in Group R at 2 hours. However, differences started to appear at later time points.

At 3 hours after administration, Group L had a slightly higher mean score of 1.9, while Group R had a mean motor block score of 1.5. This difference was statistically significant, indicating that motor block regression was slower in Group L compared to Group R.

By 4 hours, the difference between the two groups became more apparent. Group R exhibited further regression with a mean score of 2.37, while Group L showed a higher mean score of 2.6. Although the difference was not statistically significant, the trend suggests a slower regression in Group L. At 5 hours, Group R had a complete regression of motor block, with a mean score of 4.00, while Group L still showed some residual block with a mean score of 3.8. This disparity was statistically significant, reaffirming the slower regression of motor block in Group L compared to Group R. From 6 to 8 hours, both groups reached complete regression, as indicated by mean scores of 5.00 or 6.00, with no significant difference observed between the groups. Our study results coincide with the following studies. J B Whiteside et al[14] conducted a study and reported that Patient who received Intrathecal ropivacaine mobilize sooner and urinate sooner compared to Bupivacaine group. His study compared 3ml hyperbaric ropivacaine and bupivacaine. Nevel Boztug et al[12] also conducted another study where he proved that first ambulation were similar between the intrathecal ropivacaine and bupivacaine group. His study included patients randomly receiving 3 ml solution of either 15 mg of isobaric ropivacaine or 7.5 mg of isobaric bupivacaine. D A McNamee et al[15] who conducted his study on 60 patients undergoing THA where he randomized them to receive either intrathecal ropivacaine 17.5mg 3.5ml volume or intrathecal bupivacaine 17.5mg 3.5ml volume. He reported in his study that the median duration of complete motor block was significantly shorter in the ropivacaine group compared to the bupivacaine group. J. F Luck et al[13] did a study where he used 3ml of hyperbaric ropivacaine, levobupivacaine and bupivacaine for spinal anaesthesia. His study showed that regression of motor block in the ropivacaine group was notably more rapid as compared levobupivacaine and bupivacaine groups. There were no significant differences between the bupivacaine and the levobupivacaine groups. Findings of our study were similar to Manazir Athar et al[58] and Dinesh Govindarao et al[10] where the study concluded that Levobupivacaine produces significantly longer duration of motor effect than ropivacaine. Manazir Athar et al[10] conducted a study where he included 60 patients undergoing lower limb orthopaedic surgery under spinal anaesthesia where randomly given either 15mg levobupivacaine 0.5% (3ml) or 22.5mg ropivacaine 0.75% (3ml).

Our study was contradictory to **M. B Breebaart et al[16]** where he conducted a study for 90 patients

who received either isobaric lidocaine 60 mg, ropivacaine 15 mg, or levobupivacaine 10 mg intrathecally. He concluded similar motor block effect among lidocaine, ropivacaine and levobupivacaine.

In Group L, out of 30 patients, 25 patients (83.3%) did not experience POUR, while five patients (16.7%) did. Similarly, in Group R, out of 30 patients, 25 patients (83.3%) did not experience POUR, and five patients (16.7%) did. When considering the total number of patients across both groups (60), 50 patients (83.3%) did not experience POUR, while ten patients (16.7%) did. The statistical analysis, calculated using Pearson Chi-Square, resulted in a value of 0.000 with a p-value of 1.000. This indicates that the observed differences in POUR incidence between Group L and Group R were not significant. Based on this analysis, we can conclude that there is no significant difference in the incidence of POUR between the two groups.

The table indicates that 83.3% of patients in Group L had Grade 0 POUR, while 6.7% had Grade 1 and 10.0% had Grade 2. Similarly, in Group R, 83.3% had Grade 0, 3.3% had Grade 1, and 13.3% had Grade 2 POUR. Overall, most patients in both groups had Grade 0 POUR, and only a small percentage had higher grades of urinary retention. The Pearson Chi-Square test statistical analysis shows that the observed differences in POUR grades between Group L and Group R were not statistically significant (p-value = 0.788). This indicates no significant association between intrathecal levobupivacaine and ropivacaine and the severity of POUR.

The following studies have similar results as our study. N Waterhouse et al[17] study reported that approximately 10% (11 out of 103) of the patients acquired POUR out of which 4 patients needed catheterization while other 7 patients required urological management. He studied factors associated with acute urinary retention Another study conducted by S Stallard et al[18] reported 18 people (6%) developed postoperative retention and needed catheterization. A total of 30 patients (including those who were catheterized) experienced difficulty passing urine postoperatively (11%) of these, 21 were men and 9 were women. 12 of these patients (all men) eventually managed to pass urine with the help of simple measures.

Another study done by Charles M Lawrie et al[19] reported that 6 patients who required indwelling catheterization for intraoperative monitoring were excluded. 76 patients experienced POUR and required straight catheterization ie grade 2 of POUR. 14 patients ultimately required indwelling catheterization. He used intrathecal 0.5% Bupivacaine 3-4ml dose. Patients receiving more dose of the anaesthetic developed POUR easily. Probable cause of difference in grading of POUR is due to use of intraoperative fluids and duration of surgery. Shahla Haleem et al[20] conducted a study where he used 2 drugs for spinal anaesthesia that is hyperbaric 0.5% bupivacaine 12.5mg and isobaric ropivacaine 0.75% 18.75mg. He reported in their study that ropivacaine required lesser time to void and no patient developed POUR. Ropivacaine required less time probably due to its isobaric nature.

Adverse Effects

No incidences of hypotension, bradycardia, Postoperative nausea and vomiting, shivering and respiratory depression were seen. A study by Manazir Athar et al[10] reported that, in their study, all the participants, in the two groups were haemodynamically stable. the higher incidence of transient hypotension seen with ropivacaine could arise due to quicker attainment of maximum height of block in comparison to levobupivacaine resulting in fall blood pressure in his study. He conducted a study where he included 60 patients undergoing lower limb orthopaedic surgery under spinal anaesthesia where randomly given either 15mg levobupivacaine 0.5% (3ml) or 22.5mg ropivacaine 0.75% (3ml).

Conclusion

Comparison between intrathecal Levobupivacaine and intrathecal ropivacaine concluded that Intrathecal Levobupivacaine provides long duration of sensory and motor blockade in lower limb surgeries as compared to intrathecal ropivacaine. Therefore, can be used for anticipated long lower limb orthopaedic surgeries. There was no significant difference in the incidence of POUR between the two groups. Although POUR can depend on various other risk factors like gender, age or presence of BPH.

However, as the sample size was small in our study, the findings need to be corroborated with further studies conducted on larger sample size.

References

1. Baldini G, Bagry H, Aprikian A, Carli F. Postoperative urinary retention: anesthetic and perioperative considerations. Anesthesiology. 2009 May;110(5):1139-57. T
2. Darrah DM, Griebling TL, Silverstein JH. Postoperative urinary retention. Anesthesiol Clin. 2009 Sep;27(3):465-84, table of contents.
3. ammela T, Kontturi M, Lukkarinen O. Postoperative urinary retention. II. Micturition problems after the first catheterization. Scand J Urol Nephrol. 1986;20(4):257-60.
4. Oishi CS, Williams VJ, Hanson PB, Schneider JE, Colwell CW, Walker RH. Perioperative bladder management after primary total hip arthroplasty. J Arthroplasty. 1995 Dec;10(6):732-6.
5. Dreijer B, Møller MH, Bartholdy J. Post-operative urinary retention in a general surgical

population. Eur J Anaesthesiol. 2011 Mar;28(3):190-4.
6. Elsamra SE, Ellsworth P. Effects of analgesic and anesthetic medications on lower urinary tract function. Urol Nurs. 2012 Mar-Apr;32(2):60-7; quiz 68.
7. Lingaraj K, Ruben M, Chan YH, Das SD. Identification of risk factors for urinary retention following total knee arthroplasty: a Singapore hospital experience. Singapore Med J. 2007 Mar;48(3):213-6. PMID: 17342289.
8. Zanfini BA, Paradisi G, Savone R, Catarci S, Quagliozzi L, De Waure C, Caruso A, Draisci G. Bladder function after spinal anesthesia for cesarean section: an urodynamic evaluation. Eur Rev Med Pharmacol Sci. 2012 Oct;16(11):1525-9. PMID: 23111965.
9. Govindarao, D., & Priya, L. (2020). Study of spinal anaesthesia with isobaric levobupivacaine and ropivacaine in elective lower limb orthopaedic surgeries. *Indian Journal of Clinical Anaesthesia*, *5*(1), 120–124.
10. Manazir Athar, Syed Moied Ahmed, Shahna Ali, Kashmiri Doley, Ankur Varshney, Mohd. Masood Hussain Siddiqi, Levobupivacaine or ropivacaine: A randomised double blind controlled trial using equipotent doses in spinal anaesthesia, Colombian Journal of Anesthesiology, Volume 44, Issue 2, 2016, Pages 97-104
11. Gautier PE, De Kock M, Van Steenberge A, Poth N, Lahaye-Goffart B, Fanard L, Hody JL. Intrathecal ropivacaine for ambulatory surgery. Anesthesiology. 1999 Nov;91(5):1239-45. doi: 10.1097/00000542-199911000-00013. PMID: 10551572.
12. Boztuğ N, Bigat Z, Karsli B, Saykal N, Ertok E. Comparison of ropivacaine and bupivacaine for intrathecal anesthesia during outpatient arthroscopic surgery. J Clin Anesth. 2006 Nov;18(7):521-5. doi: 10.1016/j.jclinane.2006.03.006. PMID: 17126781.
13. Luck JF, Fettes PD, Wildsmith JA. Spinal anaesthesia for elective surgery: a comparison of hyperbaric solutions of racemic bupivacaine, levobupivacaine, and ropivacaine. Br J Anaesth. 2008 Nov;101(5):705-10. doi: 10.1093/bja/aen250. Epub 2008 Sep 2. PMID: 18765643.
14. Whiteside JB, Burke D, Wildsmith JA. Comparison of ropivacaine 0.5% (in glucose 5%) with bupivacaine 0.5% (in glucose 8%) for spinal anaesthesia for elective surgery. Br J Anaesth. 2003 Mar;90(3):304-8. doi: 10.1093/bja/aeg077. Erratum in: Br J Anaesth. 2003 Jun;90(6):817. PMID: 12594141.
15. Boztuğ N, Bigat Z, Karsli B, Saykal N, Ertok E. Comparison of ropivacaine and bupivacaine for intrathecal anesthesia during outpatient arthroscopic surgery. J Clin Anesth. 2006 Nov;18(7):521-5. doi: 10.1016/j.jclinane.2006.03.006. PMID: 17126781.
16. Breebaart MB, Vercauteren MP, Hoffmann VL, Adriaensen HA. Urinary bladder scanning after day-case arthroscopy under spinal anaesthesia: comparison between lidocaine, ropivacaine, and levobupivacaine. Br J Anaesth. 2003 Mar;90(3):309-13. doi: 10.1093/bja/aeg078. PMID: 12594142.
17. Waterhouse N, Beaumont AR, Murray K, Staniforth P, Stone MH. Urinary retention after total hip replacement. A prospective study. J Bone Joint Surg Br. 1987 Jan;69(1):64-6. doi: 10.1302/0301-620X.69B1.2434510. PMID: 2434510.
18. Stallard S, Prescott S. Postoperative urinary retention in general surgical patients. Br J Surg. 1988 Nov;75(11):1141-3. doi: 10.1002/bjs.1800751128. PMID: 3208051.
19. Lawrie CM, Ong AC, Hernandez VH, Rosas S, Post ZD, Orozco FR. Incidence and Risk Factors for Postoperative Urinary Retention in Total Hip Arthroplasty Performed Under Spinal Anesthesia. J Arthroplasty. 2017 Dec;32(12):3748-3751. doi: 10.1016/j.arth.2017.07.009. Epub 2017 Jul 15. PMID: 28781015.
20. Haleem S, Ozair A, Singh A, Hasan M, Athar M. Postoperative urinary retention: A controlled trial of fixed-dose spinal anesthesia using bupivacaine versus ropivacaine. J Anaesthesiol Clin Pharmacol. 2020 Jan-Mar;36(1):94-99. doi: 10.4103/joacp.JOACP_221_18. Epub 2020 Feb 18. PMID: 32174666; PMCID: PMC7047698.