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INCIDENCE AND ASSOCIATED RISK FACTORS OF POSTOPERATIVE URINARY RETENTION AFTER SPINAL ANESTHESIA AT TERTIARY CARE HOSPITAL, PESHAWAR

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Abstract

Postoperative urinary retention (POUR) is a common but often under-recognized complication following spinal anesthesia, particularly in lower limb and pelvic surgeries. This study aimed to determine the incidence of POUR and assess its association with spinal anesthetic drugs and other perioperative factors.

A descriptive cross-sectional study was conducted on 100 patients who underwent various surgical procedures under spinal anesthesia. Data were collected on patient demographics, medical history, type and duration of surgery, anesthetic agents used, and the occurrence, onset, symptoms, and management of POUR. Chi-square tests were used to assess the association between POUR and anesthetic drug type.

The overall incidence of POUR was 6%. All cases occurred in patients who received Bupivacaine (6 out of 96), while none occurred in the Lidocaine group (0 out of 4). However, the association between the type of spinal anesthetic drug and POUR was not statistically significant ($p = 0.606$). All POUR cases began more than 24 hours postoperatively and presented with decreased urine flow, painful urination, or incomplete voiding. Intermittent catheterization was used in all cases, and urinary retention persisted for more than 24 hours in each. No significant associations were found between POUR and patient age, gender or diabetes.

The incidence of POUR in patients receiving spinal anesthesia was low but clinically relevant. Although all cases occurred with Bupivacaine, no significant association was found between the anesthetic drug and POUR. Vigilant postoperative monitoring and timely management are recommended, and further studies with larger, balanced samples are needed to better understand contributing factors.

CHAPTeR 1

INTRODUCTION

1.1 Background

Spinal anesthesia is a commonly used regional anesthetic method, especially for procedures concerning the lower belly, pelvis, and lower limbs. Its quick onset, efficient pain management, and fewer systemic side effects than general anesthetic account for its widespread use. However, spinal anesthesia has drawbacks just like any other medical procedure (Garg *et al.*, 2021). Postoperative urinary retention (POUR), which is defined as the inability to freely void urine while having a full bladder, is one of the most clinically important consequences. Postoperative urinary retention (POUR) is a multi-faceted phenomenon and one of the most crucial postoperative issues that may lead to patient discomfort, bladder overdistention, UTIs, and prolonged length of stays (Geller, 2014).

Postoperative urinary retention (POUR) following spinal anesthesia is of special concern in orthopedic procedures such as hip and knee replacement procedures in which spinal anesthesia has become a significant modality. The long-term immobilization of these surgical procedures, acute postoperative pain, severe pain, and the use of narcotics may aggravate urinary retention. Although it has clinical implications, there is little to be known about the prevalence, risk factors, and consequences of postoperative urine retention (POUR) following spinal anesthesia and specifically regarding orthopedic surgery. (Lawrie *et al.*, 2017).

Postoperative urinary retention (POUR) after surgery is defined as the results of the inadequate emptying of the bladder due to the neurogenic or non-neurogenic causes that produce a higher amount of residual pee volume six hours after the operation ceases (Biardeau, 2024). One of the most often reported clinical issues in postoperative care is postoperative urine retention (POUR), which can occur in 3 to 78% of patients throughout the surgical follow-up. This sickness is often overlooked among surgical consequences since temporary or intermittent catheterization, which is an outpatient treatment option, does not increase hospital resources in terms of costs and medication-related side effects. Numerous studies have shown that even after a single medication injection into the cerebrospinal fluid column, spinal anesthesia can affect the micturition cycle (Brouwer *et al.*, 2021).

Nearly every patient undergoing hernia repair will be given neuraxial blockade in one form or another as a general or spinal anesthetic throughout the procedure. Given the proximity of the main nerves governing urine function, it is debatable whether either anesthetic technique will have a good or negative impact on the rate of urine retention (Joy, 2018). Both approaches offer risks and benefits. Alternatively, in the immediate postoperative period, general anesthesia may cause sedation or confusion in these individuals, which may temporarily hinder their ability to walk and void. Healthcare providers performing ambulatory surgery would expect better facilitation of emptying and quicker resolution of neural blockade from the physiological perspective of spinal anesthesia's distribution of blockade (Begani *et al.*, 2019).

1.2 Postoperative Urinary Retention (POUR):

Postoperative urinary retention refers to the inability to empty oneself of whatever urine they may have following surgery even when the bladder is full leading to a need to catheterize. Its occurrence is reported between 5-70 percent, and

it is a common complication that depends on the surgery performed, the demographics of the patient, and the anesthetic method which is followed (Colleen D McDermott *et al.*, 2023). Urinary retention following surgery is not only a temporary inconvenience, but also notable clinically, which entails:

1. Patient Discomfort: Often difficulty in voiding brings about a great deal of pain and distress.

2. Bladder Overdistension: Extended retention may result in the destruction of the walls of the bladder towards a poor performance of detrusor.

3. Infections: Catheterization causes an increase in the risk of urinary tract infections (UTIs), which must often take place to treat POUR.

4. Extended Stays: POUR patients will often require extended stays in the hospital as a precaution and to receive health maintenance as well, increasing the cost of healthcare (J Jackson *et al.*, 2018).

1.3 Pathophysiology of POUR After Spinal Anesthesia:

The process, by which POUR takes place after spinal anesthetic, is complex and depends on numerous factors. The most significant are the following mechanisms:

1. Blockade of Sacral Nerve Roots: Spinal anesthesia causes the temporary paralysis of lightweight mainframes because of the blocking of the sacral nerve roots (S2-S4) that manifests in control of bladder contraction.
2. Enlarged Bladder: Under anesthesia, the wall of the bladder relaxes and the bladder capacity increases and the desire to void as well as the feeling of fullness is postponed.
3. Spinal anesthesia-mediate profile disruption of the balance between the innervation of the bladder sympathetic and parasympathetic broadens the problem of retention.
4. Post-Operative Pain and Analgesics: Other analgesics and opioids because they suppress the micturition reflex, could lead to an aggravation of urine retention (Neal *et al.*, 2015).

1.4 Risk Factors for Postoperative Urinary Retention (POUR):

There are patient and surgery-related factors influencing the probability to experience POUR:

1. Patient Factors: A pre-existing diabetes mellitus, male gender, advanced age, benign prostatic hyperplasia (BPH) and dysfunction in the bladder.
2. Surgical Factors: Lower extremity orthopedic surgery, surgery of the pelvis or lower abdomen and surgery of longer duration.

3. Anesthetic Factors: Prolonged motor blockade, high dose systemic used of local anesthestics and spinal anesthesia (Hollman *et al.*, 2015).

1.5 Clinical Implications of POUR in Orthopedic Surgeries

Orthopaedic surgeries in particular those related to the lower extremity pose a unique challenging set of circumstances within the confines of POUR. Results as well demonstrate the likelihood that patients undergoing hip or knee surgeries are often elderly and more prone to have concomitant illnesses such as diabetes and BPH aside from the likelihood of care providers having to deal with urinary retention. Further, spinal anesthetic during such procedures, postoperative immobilization, and narcotic analgesia add to a recipe of a perfect storm in the occurrence of POUR. (Bjerregaard *et al.*, 2014). These clinical outcomes of POUR in this population are enormous, and they include:

1. Morbidity: Cause-effect issues with catheter use, UTIs and overdistension of the bladder.
2. Long Hospital Stay: Long hospital stay often accompanies the patients affected by POUR to check and treat their catheters.
3. Economic Burden: Extra expenses related to prolonged hospital stays, catheterization, and the management of problems (Cacciatore *et al.*, 2024).

1.6 Epidemiology:

As stated above, the cited rate of postoperative urinary retention varies in the literature from 5% to 70%, potentially due to no standardized definition of Postoperative urinary retention (POUR) utilized from study to study. We also know that different types of surgeries, different kinds of anesthetics, and different lengths of surgeries all carry various risks for Postoperative urinary retention (POUR) along with the individual patient factors of comorbidities, age, gender, and preoperative urinary function further throwing off the ability to quote a universal rate of POUR (Baldini *et al.*, 2009).

Roughly, patients undergoing outpatient general surgical procedures will develop Postoperative urinary retention (POUR) at a rate of 3.8%. Patients undergoing outpatient orthopedic procedures have been found to develop POUR at a rate of between 10 to 84%. Colorectal surgery appears to lead POUR after

anorectal surgery at anywhere between 1% and 52%. Herniorrhaphy leads to POUR anywhere between 5.9% and 38% of the time (A. J. Pomajzl & L. E. Siref, 2023).

Spinal anesthesia, a neuraxial blockade technique involving the injection of local anesthetic into the subarachnoid space, offers several advantages for certain surgical procedures, including muscle relaxation, reduced intraoperative blood loss, and potentially faster recovery. However, its impact on postoperative bladder function and the subsequent risk of Postoperative urinary retention (POUR) is not fully elucidated. Theoretically, spinal anesthesia, by temporarily interrupting the neural pathways involved in bladder control, could contribute to urinary retention. However, the extent and duration of this effect, and whether it translates to a clinically significant increase in POUR, requires further investigation (Toscano, 2024).

CHAPTER 2

LITERATURE REVIEW

Gautam *et al.* (2023) carried out study in Pakistan to determine the efficiency of tamsulosin in reversing urine retention following an equally well-documented study on post- operative anesthesia of Pakistan patients.. Department of Urology, Mayo Hospital, KEMU, Lahore Winter 2020–Winter 2021. Using non-probability purposive sampling, the study only recruited 106 patients, with 53 people in each group. In one group of patients undergoing spinal anesthesia for surgery, tamsulosin was administered, while in another group, it was not. Urinary retention was evaluated in postoperative patients. Compared to the Tamsulosin group, the placebo group experienced a considerably higher incidence of postoperative urine retention. For example, the hernia group's total result was 26.42 vs. 3.77%, the hydrocele groups were 33.3 vs. 7.7%, and the p-value was 0.001.

Nicholas S. Hernandez *et al.* (2022) conducted a study that Postoperative urine retention (POUR) rates following elective lumbar surgery performed under spinal anesthesia versus general anesthesia were evaluated in this study. Postoperative urinary retention (POUR) was considerably lower in the spinal group (4.3%) than in the general anesthesia group (9.1%, $p = 0.005$) out of 422 spinal anesthesia and 416 general anesthetic cases. Shorter hospital stays, fewer operating hours, and no intraoperative catheterization were all linked to spinal anesthesia. Although diabetes ($p = 0.003$), BPH ($p = 0.014$), longer operational time ($p <$

0.001), and higher ASA ratings (p = 0.005) were risk variables, multivariable analysis verified spinal anesthesia as a protective factor against POUR (p = 0.013).

Kopel and Sharma (2021) conducted a review of the literature about postoperative urinary retention (POUR) following spine surgery. The average incidence of POUR, they discovered, was 17.2%. The use of a Foley catheter, benign prostatic hypertrophy, older age, male gender, prior spinal surgery, and greater surgical length were all recognized as risk factors.

Lawrie *et al.* (2017) studied that the risk variables for postoperative urinary retention (POUR) after total hip arthroplasty (THA) under spinal anesthesia were investigated. Out of 180 patients, 14 (7.8%) needed indwelling catheterization and 76 (42.2%) needed straight catheterization. Intraoperative fluid volume (P =.018) and a history of urine retention (P=.023) were strongly correlated with POUR. Increased specificity for POUR was associated with higher intraoperative fluid amounts of 2025, 2325, 2875, and 3800 mL (60%, 82.7%, 94.9%, and 98%, respectively). Gender, BMI, ASA class, history of incontinence or polyuria, postoperative opioid use, and length of surgery did not significantly correlate.

Simsek and Sureyya Karaoz (2017) studied under spinal anesthesia,the randomized controlled research assessed how nurse interventions affected the prevention and treatment of postoperative urinary retention (POUR) in patients after orthopedic surgery. Between 2013 and 2014, 132 patients were split into intervention and control groups (66 each) in a public hospital. A Postoperative urinary retention (POUR) management protocol was used to provide nurse care to the intervention group, while the control group was merely monitored. The findings revealed that almost every patient in the control group experienced postoperative urinary retention (POUR) and approximately 33 percent of them needed catheterization and that this was not the case with nearly any patient in the intervention group. This will demonstrate how successful nurse interventions in the prevention of the prevalence of postoperative urinary retention (POUR) and catheterization.

Akkoc *et al.* (2016) carried out study in Turkey compared the prophylactic effect of alfuzosin and tamsulosin regarding post-operative urine retention (POUR) after the administration of urological procedures using spinal anesthesia as well as on the basis of the randomly controlled experiment. The study was selected randomly with 180 male patients being divided into three groups or alfuzosin,

tamsulosin, and placebo. Based on the results, both tamsulosin and alfuzosin substantially decreased the rate of POUR as opposed to that of the placebo-treated group. However, no distinct change were observed between the two groups of the drugs in terms of efficacy.

A. A. a. Niazi and M. A. a. Taha (2015) When compared, general anesthesia (G) and spinal anesthesia (S) in lower limb surgeries such as internal fixation surgery of the lower limb and knee arthroscopy, they reported that the spinal anesthetic groups (S1: 20%, S2: 35%) experienced significantly more urinary retention cases compared to the general anesthetic group (G: 8%). They were found to differ in spontaneous micturition, residual volume and latency to micturition after anesthesia.

Sung *et al.* (2015) carried out an intensive study of 15681 patients after orthopaedic surgery that was aimed at establishing prevalence and risk factors of postoperative urine

retention (POUR). Age, male sex, particular surgical procedures, hypertension, and diabetes mellitus were some of the risk factors of POUR that affected about 2.3 percent of patients. The study said that it is necessary to identify these risk factors to enact preventive measures to decrease the rate of POUR incidence among orthopaedic surgical procedures patients.

Under spinal anesthesia, Uy *et al.* (2011) tested the effectiveness of bethanechol chloride /anal surgery (POUR) prevention of urine retention. Each of the 106 trial participants was arbitrarily given either Bethanechol chloride or placebo. The difference in the outcome was highly significant as the incidence of POUR was significantly low in the bethanechol sample as compared to the placebo sample (6.52 percent versus 23.33 percent). Furthermore, the urine volume of subjects who used bethanechol in average was considerably reduced. The findings of the study show that bethanechol chloride could be a valuable prophylactic medication to inhibit POUR following the application of anal surgery along with spinal anesthesia.

Park *et al.* (2010) explored the possibility of decreasing the post-injection sitting time after using spinal saddle block anesthesia. 216 patients in their study were subjected to a single dosage of 0.5 percent of hyperbaric bupivacaine and only one-minute sitting time after which they were prepped to the surgical area. This

better method rendered adequate anesthetic and pain relief and the outcomes revealed a low rate of urinary retention (3.2 percent). It is an indication that a reduction in the length of sitting time after the injection of anesthesia in the spine could be safe and effective in providing spinal saddle block anesthesia, which may possibly lower the chances of post-surgery complications.

Feliciano *et al.* (2008) In a retrospective descriptive study, they analysed 102 patients and 44.1 per cent of them had postoperative urine retention (POUR). The not-quite statistically significant, clinically relevant finding was the mean stay in PACU that was 26 minutes longer in patients with POUR than those without. The mean length of bladder volume on admission was 467.6 mL in PACU. The values above 500 mL had significant results related to POUR (2 =.00). Administering of a bladder drainage remedy during the close of the operation or hospitalization may make the patients feel more comfortable and reduce their staying time in PACU.

Aim And Objectives

Aim:

This study aims to determine the incidence, onset, clinical features, and management of postoperative urinary retention (POUR), and to assess its association with the type of spinal anesthetic drug used—lidocaine or bupivacaine—while considering patient demographics, comorbidities, surgery type, and perioperative analgesic use.

Objectives:

1. To determine the incidence of postoperative urinary retention in patients who received spinal anesthesia.
2. To find out patient-related, surgical, and anesthetic factors contributing to postoperative urinary retention in spinal anesthesia cases.

SIGNIFICANCE OF THE STUDY

The study informs on the incidence, progression, and treatment of postoperative urinary retention (POUR), which is one of the most widespread but neglected outcomes as it may cause discomfort to a patient, affecting the recovery process. The research would improve postoperative management strategies through the determination of clinical presentation, timing, and treatment options of POUR that will prevent complications, such as bladder overdistension and urinary tract infection. The evaluation of the interaction

between the kind of a spinal anesthetic drug and incidence of POUR also contributes to the already existing body of knowledge and directs clinicians in selecting their types of anesthetics. Besides the discussion of the results to aid POUR research in similar patients in the future, the findings can assist the medical staff to achieve preventative measures, recognize the high-risk patient, and optimize future surgical outcomes.

CHAPTER 3

MATERIALS AND METHOD

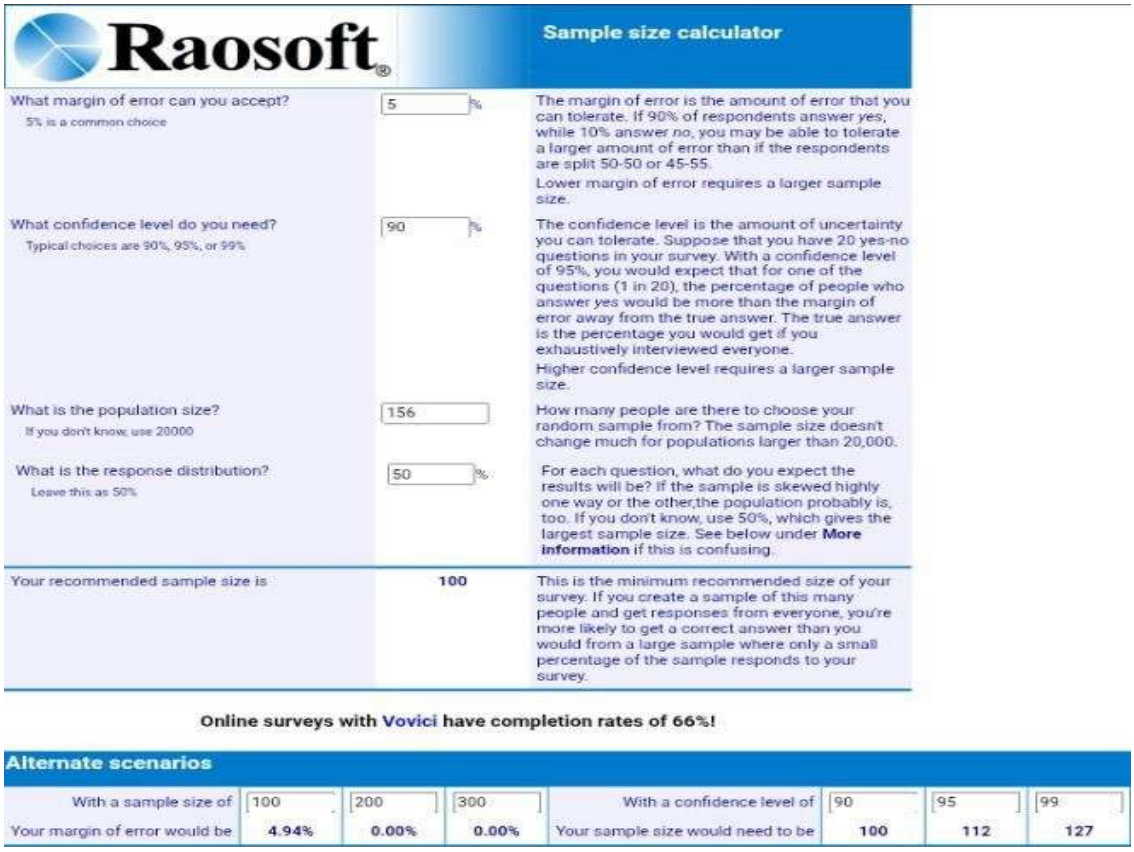
3.1 Study Setting

The study was conducted at:

- Shahab Orthopaedic and General Hospital, Peshawar
- Afridi Medical Complex. Peshawar

3.2 Study Design

The descriptive cross-sectional study design was used to determine the incidence and the risk factors of Postoperative urinary retention (POUR) to the patients who received spinal anesthesia.



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Sample size calculator

What margin of error can you accept? 5% is a common choice	5 %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? Typical choices are 90%, 95%, or 99%	90 %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? If you don't know, use 20000	156	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? Leave this as 50%	50 %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other,the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under **More information** if this is confusing.
Your recommended sample size is	100	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

Online surveys with Vovici have completion rates of 66%!

Alternate scenarios

With a sample size of	100	200	300	With a confidence level of	90	95	99
Your margin of error would be	4.94%	0.00%	0.00%	Your sample size would need to be	100	112	127

3.3 Sample Size

The 100 sample size is calculated using raosoft calculator.

3.4 Sample Technique

A non-probability convenient sampling method was utilised to recruit 100 patients in total. It was resolved that the sample size was adequate enough to be used in the descriptive analysis and also allow for the use of inferential statistics with the aim of comparing subgroups.

3.5 Sample Selection

Criteria Inclusion Criteria

The reasons why participants were chosen were as follows:

1. Eighteen years old and above adult patients who experienced spinal anesthesia either as urgent or elective surgery.
2. Patients who underwent surgeries with a duration ranging from 30 minutes to 6 hours, to standardize surgical exposure and anesthesia time.

3. The surgical procedures were limited to those involving the lower abdomen, pelvis, or lower limbs, areas commonly associated with increased risk of postoperative urinary retention (POUR) due to spinal anesthesia effects.

Exclusion Criteria

The following exclusion criteria were applied to control for potential confounding variables:

1. Patients with neurological disorders that could impact bladder innervation and function, thereby confounding the assessment of spinal anesthesia's effects.
2. Patients who were preoperatively or intraoperatively catheterized for unrelated medical indications, as this would affect the evaluation of postoperative urinary retention.

3.6 Data Collection Procedure

Data were collected through direct observation, patient interviews, and medical record reviews. Demographic variables such as age, sex, and body mass index (BMI), along with medical history and surgical details, were documented systematically. Baseline bladder function was assessed preoperatively through patient history and clinical evaluation. Information regarding the type and dose of spinal anesthesia, as well as duration of surgery and volume of intravenous fluids administered intraoperatively, was recorded.

Following surgery, patients were monitored in the recovery and ward settings. Signs and symptoms of urinary retention—such as inability to void within six hours postoperatively, bladder distension, and patient-reported discomfort—were closely observed. In suspected cases, ultrasound bladder scanning was utilized to determine residual urine volume, confirming Postoperative urinary retention (POUR) where necessary. The requirement for catheterization was documented as the primary outcome of interest. Secondary outcomes included time to first voiding, incidence of complications (e.g., infections, haematuria), and the association of POUR with variables such as age, gender, and type of surgery.

3.7 Statistical Analysis

Data collected were entered into SPSS Statistics software, version 27.0 for analysis. Descriptive statistics including frequencies were used to summarize patient demographics and clinical characteristics. Inferential statistical tests such as Chi-square tests were applied to identify associations between categorical variables (e.g., and incidence of POUR).

CHAPTER 4

RESULTS

This study included 100 patients who underwent spinal anesthesia for various surgical procedures. Postoperative urinary retention (POUR) occurred in only 6% of the cases, with most patients having no risk factors like diabetes, or bladder-affecting medications.

4.1 Age of the patient

The majority of patients were aged 36–45 years (29%), followed by 46–60 years (20%), 26–

35 years (18%), 60 years and above (17%), and 18–25 years (16%). These results are shown

in Tab 4.1.

Table 4.1 Age of the participants

Age of the patient		
	N=100	Percentage
18-25 years old	16	16.0%
26-35 years old	18	18.0%
36-45 years old	29	29.0%
46-60 years old	20	20.0%
60 years old and above	17	17.0%

4.2 Gender of the patient

Out of 100 participants, 56% were male and 44% were female. These results are shown in the table 4.2.

Table 4.2 Gender of the patient

Gender of the participant		
	N=100	%
Male	56	56.0%
Female	44	44.0%

4.1 Weight of the patient

The weight distribution showed that 37% of patients weighed between 60–70 kg, 32% were above 70 kg, and 31% were between 50–60 kg which are shown in Table 4.3.

Table 4.3 Weight of the patient

Weight of the patient		
	N	%
50-60 kg	31	31.0%
60-70 kg	37	37.0%
Above 70 kg	32	32.0%

4.2 Diabetes Status

21% of the patients were diabetic, while the majority (79%) were non-diabetic which are shown in Table 4.4.

Table 4.4 Diabetes status

Do you have diabetes		
	N	%
Yes	21	21.0%
No	79	79.0%

4.1 Use of Medications Affecting Bladder Function

Only 3% of the patients were taking medications that could potentially affect bladder function, whereas 97% were not on such medications.

Table 4.5 Use of Medications Affecting Bladder Function

Are you currently using any medication that could affect urinary bladder function		
	N	%
Yes	3	3.0%
No	97	97.0%

4.2 Type of Surgery

The majority of participants underwent orthopedic surgery (91%), followed by urological surgery (8%), and general surgery (1%).

Table 4.6 Type of Surgery Undergone

Type of surgery undergone		
	N	%
Orthopedic surgery	91	91.0%
Urological surgery	8	8.0%
General surgery	1	1.0%

4.1 Duration of Surgery

More than half of the surgeries (52%) lasted between 66–100 minutes, while 24% lasted 30– 65 minutes, and another 24% were longer than 100 minutes.

Table 4.7 Duration of Surgery

Duration of Surgery		
	N	%
30-65 min	24	24.0%
66-100 min	52	52.0%

Above 100 min	24	24.0%

4.1 Type of Spinal Anesthetic Drug Used

Bupivacaine was used in 96% of the patients, whereas lidocaine was administered in 4%. These results are shown in Table 4.8.

Table 4.8 Type of Spinal Anesthetic Drug Used

Type of Spinal Anesthetic drug used		
	N	%
Bupivacaine	96	96.0%
Lidocaine	4	4.0%

4.2 Additional Analgesics (Opioids or NSAIDs)

17% of the patients received additional analgesics, while 83% did not which are shown in below Table 4.9.

Table 4.9 Additional Analgesics (Opioids or NSAIDs)

Did you receive any additional analgesics(Opioids, NSAID)		
	N	%
Yes	17	17.0%
No	83	83.0%

4.1 Postoperative Urinary Retention (POUR)

Only 6% of the participants reported difficulty passing urine after surgery, indicating the incidence of postoperative urinary retention, while 94% did not experience any difficulty.

Table 4.10 Postoperative Urinary Retention (POUR)

Did you experience difficulty passing urine after surgery?		
	N	%
Yes	6	6.0%

No	94	94.0%

4.2 Onset of Urinary Retention

All 6 patients (6.0%) who experienced urinary retention reported that the difficulty began more than 24 hours after surgery. The remaining 94 patients (94.0%) did not report any urinary retention.

Table 4.11 Onset of Urinary Retention

How long after surgery did the difficulty begin?		
	N	%
More than 24 hours	6	6.0%
No POUR	94	94.0%

4.3 Urinary Symptoms Experienced

Among the 6 patients with POUR; 3 patients (3.0%) reported decreased urine flow. 2 patients (2.0%) experienced painful urination. 1 patient (1.0%) had incomplete voiding. 94% of participants reported no symptoms of urinary retention.

Table 4.12 Urinary symptoms experienced

What urinary symptoms appear?		
	N	%
Inability to void completely	1	1.0%
Decreased urine flow	3	3.0%
Painful Urination	2	2.0%
No POUR	94	94.0%

4.1 Catheterization Requirement

All 6 patients (6.0%) with POUR required catheterization to relieve retention. The remaining 94 patients (94.0%) did not require any catheterization.

Table 4.13 Catheterization requirement

Was Catheterization required?		
	N	%
Yes	6	6.0%
No POUR	94	94.0%

4.2 Method of Management

All cases (6.0%) were managed using intermittent catheterization. No cases required continuous or long-term catheter use. 94% of patients did not require any management related to urinary retention.

Table 4.14 Method of Management

How was urinary retention managed		
	N	%
Intermittent catheterization	6	6.0%
No POUR	94	94.0%

4.1 Duration of Urinary Retention

In all 6 POUR cases, urinary retention persisted for more than 24 hours. 94**%** of participants experienced no urinary retention.

Table 4.15 Duration of Urinary Retention

How long did urinary retention persist?		
	N	%
more than 24 hours	6	6.0%
No POUR	94	94.0%

4.2 Cross Tabulation of Type of anesthetic drug used and difficulty in urination

According to the crosstabulation between postoperative urinary retention (POUR) and the kind of spinal anesthetic medication used, patients who got Bupivacaine experienced all six cases of POUR (6 out of 96; 6.25%), whereas none of the four patients who received lidocaine experienced urinary retention. According to this, POUR was only seen in the group who received buprevacaine. Nevertheless, a p-value of 1.0 from the Chi-square test showed no statistically significant correlation between the kind of spinal anesthesia and the incidence of urine retention. The Lidocaine group's extremely small sample size, which makes it difficult to draw definitive conclusions, is probably the cause of this lack of significance.

Table 4.16 Cross Tabulation of Type of anesthetic drug used and difficulty in urination

Did you experience difficulty passing urine after surgery? * Type of Spinal Anesthetic drug used Crosstabulation				
		Type of Spinal Anesthetic drug used		Total
		Bupivacaine	Lidocaine	
Did you experience difficulty passing urine after surgery?	Yes	6	0	6
	No	90	4	94
Total		96	4	100

4.1 Association between type of Anesthetic drug used and onset of POUR.

The Chi-Square test results presented assess the association between the type of spinal anesthetic drug used and the occurrence of postoperative urinary retention (POUR). The Pearson Chi-Square value is 0.266 with 1 degree of freedom and a p-value of 0.606, indicating no statistically significant association between the two variables. The Continuity Correction (used for 2x2 tables to adjust for small sample size) shows a value of 0.000 with a p-value of 1.000, further confirming the lack of significance. The Likelihood Ratio Chi- Square, which is an alternative to Pearson's, is 0.506 with a p-value of 0.477, also supporting the same conclusion. Additionally, the Linear-by-Linear Association value is 0.263 ($p = 0.608$), suggesting no significant linear trend between the variables.

Table 4.17 Association between type of Anesthetic drug used and onset of POUR.

Chi-Square Tests

	Value	df	*P* value
Pearson Chi-Square	.266[a]	1	.606
Continuity Correction[b]	.000	1	1.000
Likelihood Ratio	.506	1	.477
Linear-by-Linear Association	.263	1	.608
N of Valid Cases	100		

DISCUSSION

This study investigated the incidence and associated factors of postoperative urinary retention (POUR) in 100 patients undergoing various surgical procedures under spinal anesthesia. Our findings reveal a low incidence of POUR (6%) in the study population, with all cases occurring in patients who received bupivacaine. However, statistical analysis did not demonstrate a significant association between the type of spinal anesthetic used and the occurrence of POUR.

The observed incidence of POUR (6%) in our cohort is consistent with the lower end of the reported range in literature, which typically varies from 5% to 70% depending on the definition of POUR, type of surgery, anesthetic technique, and patient population (Cambise *et al.*, 2024; A. A. A. Niazi & M. A. A. J. E. J. o. A. Taha, 2015). Our study had a low rate compared to some factors which may be attributed. First, unlike other surgical patterns, particularly urological or colorectal cases which is recorded to have a higher rate, majority of our patients (91%) had orthopedic surgery that could have influenced their POUR profile. (Geller, 2014; Reed *et al.*, 2023). Second, it is likely that the low rate was due to the demographics of our study cohort in that pre-existing risk factors such as diabetes were limited (21% prevalence), and that most participants were in the age range of 36-45 years. Such findings are in line with previous reports that previous urological illnesses, age, and sex have been significant risk factors to POUR among males. (Agrawal *et al.*, 2019).

During our study, the group of patients treated with bupivacaine encountered all six instances of POUR whereas they were not recorded in the lidocaine group. This apparent trend was not statistically significant with regard to the correlation

between the incidence of POUR and the type of medication that was used as spinal anesthetic (p = 0.606) as shown using the Chi- Square test.. The very small sample size in the lidocaine group (n=4) is probably the cause of this lack of statistical significance, especially the high p-value for the Continuity Correction (p=1.000). Even though bupivacaine is a frequently used long-acting local anesthetic for spinal anesthesia, POUR and delayed bladder emptying are known to be caused by its prolonged duration of action, particularly on sacral nerve roots (A. Pomajzl & L. E. Siref, 2023). In contrast, lidocaine, being a shorter-acting agent, typically allows for earlier recovery of bladder function (Nicholas S Hernandez *et al.*, 2022). Despite the statistical non- significance, the observed clinical pattern calls for more research using a larger, more balanced cohort in order to conclusively determine the relative incidence of POUR between lidocaine and bupivacaine. Current research is still examining the relative effectiveness and adverse effects of lidocaine and bupivacaine, frequently pointing out that bupivacaine has a longer half-life (Chan *et al.*, 2024; Velioglu *et al.*, 2020).

Nevertheless, in our study, not only did all POUR patients present with the symptoms of diminished urine delivery, burning during urination, nonvoiding, but all of them self-reported that their issues appeared more than 24 hours after a surgical procedure, and they required obstruction of episodes of catheterization. The clinically relevant aspect of POUR is demonstrated by the necessity of catheterization and the maintaining of the urine retention more than 24 hours even when the incidence is low. The delayed onset of POUR may be particularly challenging since some patients have been discharged by the time they are on the onset of the clinical manifestation and this may cause some issues when it goes untreated (Joni Jackson *et al.*, 2019). A typical and effective intervention of treatment of POUR is intermittent catheterization, which decreases the threat of infection and promotes bladder retraining. (Gray *et al.*, 2019; Stoffel *et al.*, 2016). To prevent problems, the new instructions and reviews still emphasize the importance of early diagnosis and successful treatment, i.e. scans of the bladder and catheterization (Colleen D. McDermott *et al.*, 2023; Serlin *et al.*, 2018).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study included 100 cases of patients undergoing spinal anesthesia that

investigated their incidence and risk factors of postoperative urine retention (POUR) in these patients. All the affected cases were reported longer than 24 hours following surgery and total incidence of POUR was 6%. These were incomplete voiding, painful urination and diminished urine volume. Every case of POUR was successfully managed by the intermittent catheterization. Although all the cases of POUR occurred in this group, a statistical analysis relied on the Chi-square test showed no correlation between the type of spinal anesthetic agent used and developing POUR ($p = 0.606$). Mostly patients were given Bupivacaine. No such noteworthy correlations were found with regards to other attributes of the patients, such as age or gender. These data indicate that albeit POUR is not being prevalent in this population group, it can be still considered an important clinical complex that needs to be known and managed in timely fashion.

Recommendations

1. Patients receiving spinal anesthetic, especially when using long-acting medications such buprevacaine, should have their urine retention symptoms checked for at least 24 to 48 hours after surgery.
2. Postoperative protocols should include routine evaluation of urine function, particularly for elderly patients or those having orthopaedic surgery.
3. To boost the strength of statistical analysis, future studies should use bigger and more evenly distributed sample sizes, particularly when comparing various anesthetic drugs.
4. Since these factors may contribute to POUR, future research should include fluid balance, mobility, pain thresholds, and intraoperative drugs.
5. POUR should be explained to higher-risk patients (such as those with diabetes or those undergoing lengthy surgery) and they should be encouraged to report any urine symptoms as soon as possible.

Limitations of the study

1. Lidocaine was administered to just 4 patients, which severely restricted the capacity to compare the effects of various anesthetic drugs and make insightful inferences.
2. To account for confounding variables such age, comorbidities, length of operation, and usage of other analgesics, the study did not perform multivariable statistical analysis.

3. Because only two institution's data was gathered, the results may not be as applicable to larger populations or various clinical contexts.
4. Patients described their urinary symptoms, which could lead to bias or underreporting, particularly when retention is mild.
5. Because the trial did not monitor long-term urine outcomes, it is unable to determine if POUR caused any chronic urinary problems or resolved completely.

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Annexure-I

Participant Information

1. Age:
2. **Gender:** ☐ Male ☐ Female
3. Weight (kg):
4. **Do you have diabetes?** ☐ Yes ☐ No
5. **Are you currently taking any medications that could affect bladder function (e.g., opioids, anticholinergics, alpha-blockers)?** ☐ Yes ☐ No ○ If yes, please list:

Preoperative Information

6. Type of surgery undergone:

- ☐ Orthopedic (e.g., hip/knee replacement)
- ☐ Urological
- ☐ General surgery (e.g., hernia repair, appendectomy)
- ☐ Gynecological
- ☐ Other (please specify):

7. **Duration of the surgery (in minutes):**

Anesthesia-Related Information

8. **Type of spinal anesthetic drug used (if known):** ☐ Bupivacaine ☐ Lidocaine ☐ Other:

9. Did you receive any additional analgesics (e.g., opioids, NSAIDs)? ☐ Yes ☐ No •

If yes, which ones?

Postoperative Urinary Retention (POUR) Assessment

1. Did you experience difficulty passing urine after surgery? ☐ Yes ☐ No

2. **If yes, how long after surgery did the difficulty begin?**

- ☐ Within 6 hours
- ☐ 6-12 hours
- ☐ 12-24 hours
- ☐ More than 24 hours

3. What urinary symptoms did you experience?

- ☐ Inability to void completely
- ☐ Decreased urine flow
- ☐ Painful urination
- ☐ Distended bladder sensation
- ☐ None

4. **Was catheterization required?** ☐ Yes ☐ No

5. If yes, how was urinary retention managed?

- ☐ Intermittent catheterization

- ☐ Indwelling catheter
- ☐ Medications (e.g., tamsulosin, bethanechol)

6. How long did urinary retention persist?

- ☐ Less than 6 hours
- ☐ 6-12 hours
- ☐ 12-24 hours
- ☐ More than 24 hours