Post-operative retention of urine after general and spinal anesthesia in general surgical patients

Om Bahadur Karki[1*]

[1]Department of General Surgery, Manipal College of Medical Sciences, Pokhara, Nepal

ABSTRACT

Introduction: Post-operative urinary retention (POUR) is an underestimated troublesome condition following surgery in which a patient cannot urinate even when the bladder is completely filled. with consequences like bladder dysfunction, urinary tract infection, and catheter-related complications. It is important to be aware and to identify patients at risk of developing POUR. The aim of the study was to determine the incidence and risk factors of POUR in general surgery patients. **Methods:** We conducted a prospective cohort study among 487 patients from January 2024 to April 2025. Ethical approval was obtained from the institutional review committee. Consecutive sampling method was used. The categorical variables were presented as frequencies, and were compared using the chi-squared test. Continuous variables were compared using the student's t test. P-value of <0.05 was considered statistically significant. **Results:** Total 487 patients were included in the study, of which 82 patients (63 males and 19 females) developed POUR with an overall incidence of 16.83%. Mean urine output was 563.7 ml. The mean age of POUR patients was significantly higher than for non-POUR patients (52.5±15.65 years vs. 47.8±14.55 years, p=0.0087). males (p=0.004), diabetes (p=0.0016), spinal anesthesia(p<0.001) were significant risk factors for the development of POUR. **Conclusions:** The incidence of POUR is higher in males, elderly patients, diabetes and patients undergoing surgery under spinal anesthesia.

Keywords: Anesthesia, post-operative, risk factors, urinary retention.

***Correspondence:**
Dr. Om Bahadur Karki
Department of General Surgery
Manipal College of Medical
Sciences, Pokhara, Nepal
Email: karkiom10@gmail.com
ORCID iD: https://orcid.org/0000-0003-4529-1588

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INTRODUCTION

Post-operative urinary retention (POUR) is the inability to urinate in the post-operative period despite having a full bladder.[1] Incidence of POUR varies in literature from 5% to 70%.[2] Risk factors for POUR include age, gender, underlying diseases, mechanical obstruction of the urinary tract, type and duration of anesthesia and surgery and the amount of fluid administered.[3-4]

If post-operative urinary retention, some propose intermittent catheterization for the reduced risk of bacteriuria while others chose indwelling catheterization to decrease both acute and long-lasting detrusor decompensation.[5] The varying definitions along with the multifactorial aetiology of POUR, are reflected by the wide-ranging reported incidence for this problem.

Currently, there is little published data on the incidence of POUR in hospitals of Nepal. In this study, we aimed to evaluate the incidence of POUR in patients who underwent general surgery and identify the risk factors associated with the development of POUR in our patient population.

METHODS

This study was designed as a prospective cohort study. After obtaining institutional ethics committee approval, patients who underwent

elective general surgery operations under general or spinal anesthesia from January 2024 to April 2025 in a teaching hospital western Nepal were included in the study.

The sample size was calculated by standard formula sample (n)= z^2pq/d^2 where, n = sample size, p = prevalence (p=9.9%. so, p = 0.099) on the basis of the prevalence of POUR from previous published study by Çakmak et al.[6] q= 1-p (1-0.099=0.901), d = precision in proportion of one (5%= 0.05), z = 1.96 at 95% confidence interval. From the calculation; n= 1.96^2 x (0.0248 x 0.0.975)/0.0025 = 136.73 (minimum sample size is 137).

Patients below 16 years of age, pregnant females, those having a history of renal failure, proven urological disease such as urethral stricture, bladder or prostatic cancer, proven neurological diseases (including neurogenic urinary bladder) and indwelling Foley's catheter before surgery were excluded from the study. Written informed consent was obtained from all patients. Decision regarding the type of the anesthesia was determined by the responsible anesthetist.

The diagnosis of POUR was made based on the occurrence of pain and discomfort upon palpation of the suprapubic area; the inability to void despite a full bladder, and the need for post-operative catheterization or requiring a urinary catheter reinsertion after indwelling catheter removal,

Pre-operative variables collected were divided into patient-related and surgery-related factors. Patient-related factors included age, gender, history of benign prosthetic hyperplasia (BPH), diabetes mellitus (DM), Hypertension (HTN) and drug history of the patient. Surgery-related factors included type of anesthesia, duration of surgery and intraoperative fluid volume. In addition, post-operative variables including development of POUR and catheter related complications like urinary tract infection (defined by growth in the urine culture sample) were also collected. Group 1 consisted of patients who had not developed POUR, whereas patients who experienced POUR were included in group 2. Demographic variables of the two groups along with the risk factors related with POUR were compared between the two groups

Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) software version 22.0 (IBM, Armonk, New York). The categorical variables were presented as frequencies, and were compared using the chi-square test. The continuous variables of the study were compared using the student's t test. P-value of <0.05 was considered statistically significant.

RESULTS

Between June 2024 and July 2025, there were 487 patients (264 male and 223 female) who underwent general surgery operations who were included in this study. Mean age of the patients was 52.5±15.65 years for POUR group and 47.8±14.55 years for non-POUR. Operations performed under general anesthesia were 324 operations and 163 operations were performed under spinal anesthesia. Out of 487 patients, 82 patients (63 male and 19 female) had POUR with an overall incidence of 16.83%. The mean urine output just after catheterization in patients who developed POUR was 563.7 mL (range, 483 to 895 mL). The catheter was removed within 24 hours or the second post-operative day in 61(74.39%) patients and later they could void on their own as well but, 21(25.6%) of 82 POUR patients had to continue catheterization for a mean of 3.6 days (range, 3 to 7 days) because of persistent POUR and failed trial removal of catheter. Out of the eight, two patients developed POUR and needed catheterization, 9(10.97%) patients were treated for catheter related complications.

According to the independent sample t-test, the mean age of POUR patients was significantly higher than for non-POUR patients (52.5±15.65 years vs. 47.8±14.55 years, p=0.0087). However, there were no significantly differences in operation time (105.8±37.5 minutes vs. 92.4±24.3 minutes, p=0.29) between POUR and non-POUR patients respectively.

Chi-square test showed that male sex (p=0.004), diabetes (24.39% vs. 10.39%, p=0.0016), were significant risk factors for the development of POUR. However, hypertension (25.6% vs. 22.46%, p=0.565) was not a significant risk factor. Similarly, perioperative fluid input in our study was not significant with the development of POUR. Type of anesthesia (General/Spinal) was also determined as a risk factor for POUR. Patients operated under spinal anesthesia were more likely to develop POUR when compared to patients operated under general anesthesia (p<0.001). (Table 1) Out of the 21 patients who developed persistent POUR (failed trial removal of catheter), only two (2.43%) developed urinary tract infection and were treated with antibiotics.

Table 1: Demographic and perioperative variables (n=487)

Variables	Group 1 (No POUR) N=405	Group 2 (POUR) N= 82	p-value
Age (mean ± SD)	47.8±14.55 years	52.5±15.65 years	0.0087*
Sex			
Male	226(55.80%)	63(76.82%)	0.004*
Female	179(44. 19%)	19(23. 17%)	
Type of anesthesia			
General	304	20	<0.001*
Spinal	101	62	
Operative time	92.4±24.3 minutes	105.8±37.5 minutes	0.29
Perioperative fluid (mL)			
<1000 ml	152(37.53%)	34(41.46%)	0.5038
>1000ml	253(62.49%)	48(58.53%)	
Diabetes Mellitus	42(10.37%)	20(24.39%)	0.0016*
Hypertension	91(22.46%)	21(25.60%)	0.565

*p<0.05 denotes statistical significance

DISCUSSION

The prevalence of POUR in our study was 16.83%, well within the range noted in literature.[7-9] Various studies have reported different prevalence rates for POUR. This wide range of incidence may be attributed to different patient populations, operative conditions and difficulties in estimating bladder volume.

According to previous studies, risk factors for development of POUR are multifactorial; they include increasing age, male gender, spinal anesthesia, previous history of urological diseases, enlargement of the prostate, urethral stricture, large amount of intravenous fluids or transfusion, long duration of surgery, and cholinergic medications and analgesics.[10-12] Age has been shown to increase the risk of POUR by 2.4 times in patients over 50 years of age.[10,13] Previous reports indicated a higher incidence of POUR in men compared to women.[10] This study demonstrated that older age (p=0.0087) , male gender (p=0.004) were the patient-related factors associated with higher risk of POUR. Risk factors for POUR in our series are consistent with previous studies: older age, male gender.[13] The different types and routes of administration of anesthesia have received extensive attention and demonstrated conflicting results.[14] Spinal anesthesia generally considered a risk factor for POUR because of the blockage of transmission of action potentials in the sacral nerves innervating the bladder.[7,15] Especially, use of long-acting local anesthetics like bupivacaine may aggravate the effect of spinal anesthesia on development of urinary retention. In our study, patients operated under spinal anesthesia were significantly associated with POUR (p<0.001). This finding may be the result of preference of bupivacaine during spinal anesthesia procedure in our study population. In contrary, surgery-related factors such as longer operating time and anesthetic time did not show a positive association in our study. But the study by Tan et al.[16] showed that prolonged surgery and anesthesia time are significant risk factors for POUR. Mulroy et al.[8] also stated that prolonged operative time is one of the risk factors for development of POUR. In the study by Cakmak et al.[6] neither the duration of operation nor the duration of anesthesia had an effect on POUR risk (p=0.510 and p=0.718, respectively). POUR might be expected in case of intravenous infusion of excessive amount of fluid during perioperative period by mechanism of overdistention of the bladder.[6] Nevertheless, there was no difference in peri-operative fluid intake >1000 mL and ≤1000 mL, respectively between the two groups in our study (p=0.5038).

Particularly, the incidence of POUR in patients undergoing anorectal surgery has been reported to vary between 1% and 52%.[17] In our study as well, of those patients who had developed POUR 31(37.80%) were operated for anorectal diseases. Injury to the pelvic nerves and internal anal sphincter hypertonia following anal pain are the reasons for this high incidence.[17]

However, we did not analyze the effect of opioids and other concomitant medications that could reinforce the impairing effect on micturition in the current study. Further studies are needed to investigate this issue. It should be further noted that association need not necessarily represent causation, and further studies are required to assess the strength.

POUR can also lead to urinary tract infection either directly (due to poor bladder emptying) or indirectly (due to catheterization).[2] The incidence of urinary tract infection in our study was 2.43% while Altschul et al.[18] reported an infection rate of 14% in the POUR group, while Hollman et al.[19] reported a rate of 1.5% infection among 15 patients with retention. When the risk factors are identified for POUR, the catheterization guidelines can be adjusted based on an individual's risk for POUR.

Limitation of this study was that ultrasonography, which is an objective method for identifying urinary retention, was not used in our study. Instead, clinical assessment was the major indicator of urinary retention. Based on our definition of POUR, we may have over or under estimated the incidence of POUR. There were possible confounding factors (e.g. procedures, post-operative analgesic drugs, etc.) that required randomized control studies to evaluate the outcomes.

CONCLUSIONS

Post-operative urinary retention is the inability to urinate in the post-operative period despite having a full bladder. Male gender, elderly age-group, spinal anesthesia and type

II diabetes mellitus are risk for development of POUR. Awareness of risk factors for POUR before surgery may help identify patients at risk, who could then benefit from the interventions, and prevent post-operative urinary retention.

CONFLICTS OF INTEREST: None declared

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AUTHORS' CONTRIBUTIONS

OBK was solely responsible for the conception, design, data collection, analysis, interpretation, and writing of this research. All aspects of the study were independently conducted and completed by the author.

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