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Urinary catheter related bladder discomforts in early post-operative period after urological surgery, a prospective hospital-based study

Prabodh Regmi[1], Chandresh Kumar Singh[2], Jay N Shah[3]

[1]Associate Prof, Department of Surgery, Devdaha Medical College and Research Institute, Nepal
[2]Resident, Department of Surgery, Devdaha Medical College and Research Institute, Nepal
[3]Prof, Department of Surgery, Chitwan Medical College, Nepal

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Abstract

Introduction: Bladder catheterization is commonly used during major surgeries for urine output monitoring, fluid management, and hemodynamic assessment. Despite its utility, catheter-related bladder discomfort (CRBD) remains under-reported in Nepal. This study aimed to determine the prevalence and severity of CRBD after urological surgery.

Method: This prospective study included all adult patients undergoing urological surgery requiring urinary catheterization from 01 Apr to 30 Sep 2025 at Devdaha Medical College, Nepal. Ethical approval was obtained. Exclusion criteria were suprapubic catheter, neurogenic bladder, trauma, pregnancy, emergency surgery, and inability to communicate. Patient-reported symptom severity was categorized into four grades using the Catheter-Related Bladder Discomfort Severity Scale. Associations with clinicodemographic variables were analysed using the Chi-square (or Fisher's exact) test, with a p-value ≤0.05 considered statistically significant.

Result: Of the 156 patients enrolled, CRBD was observed in 113(72.4%): mild in 101(64.7%), moderate in 9(5.8%), and severe in 3(1.9%). Patients older than 60 years had a higher prevalence (49/55, 87.3%) compared to those aged 60 years or younger (65/101, 64.4%). The CRBD occurred in 73/96(76.0%) of males and 40/60(66.7%) of females. Based on anaesthesia type, the incidence was 69(75.8%) with general anaesthesia, 44(71.0%) with spinal anaesthesia, and 0/3(0%) with combined general and epidural analgesia.

Conclusion: This study demonstrated a high prevalence (72.4%) of catheter-related bladder discomfort after urological surgery. Older age (≥60 years) and general anaesthesia were significantly associated with discomfort, whereas gender, surgery type, duration, and catheter size were not.

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Correspondence

Dr. Prabodh Regmi, Associate Prof, Department of Surgery, Devdaha Medical College and Research Institute, Nepal.
Email: prabodhregmi2142@gmail.com, Telephone: +977 9857831247

Introduction

The term "catheter" comes from the ancient Greek word “kathiénai”, meaning "to thrust into" or "to send down".[1] Foley catheter, first introduced by Dr. Frederick E. B. in 1930, is a soft latex rubber self-retaining urinary catheter used for bladder drainage after urological surgery, and for controlling hemorrhage.[2] Bladder catheterization is a common procedure during major inpatient surgeries, enabling precise urine output monitoring, guiding fluid resuscitation, assessing the extent of haematuria after urinary tract surgery, and serving as a key indicator of hemodynamic stability.[3] However, indications for perioperative urinary catheterization vary widely due to surgical considerations, anaesthesia type, patient conditions, institutional policies, and clinical preferences.[4]

The catheter irritates the urothelium, aggravating the inflammatory response of the bladder wall and trigone, increasing discomfort severity. Efferent branches of the pudendal nerve may cause bladder contractions, while afferent fibres transmit pain from the bladder floor, urethral sphincter, and prostate.[5] Catheter-related bladder discomfort (CRBD) induces adverse emotions and behaviours, such as agitation, fiddling with limbs, and attempts to pull out the urethral catheter.[6] CRBD further exacerbates postoperative pain and postoperative complications. It may impact the quality of life and prolong the duration of postoperative recovery.[7]

The CRBD remains understudied and under-reported in Nepal. This study aims to determine the prevalence of CRBD and its association with patients’ demographics, duration and type of surgery, and type of anaesthesia among individuals undergoing urological procedures. The findings will help to identify contributing factors and guide future strategies to address CRBD effectively in our local clinical setting.

Method

This was a prospective observational study conducted to evaluate CRBD following urological surgeries. All patients undergoing urological procedures requiring an indwelling per-urethral catheterization at Devdaha Medical College and Research Institute (DMCRI), Nepal, between 01 Apr to 30 Sep 2025, who met the inclusion and exclusion criteria, were enrolled after obtaining verbal and written informed consent. On average, around 15-25 major urological operative cases per month in the urosurgery unit in DMCRI, Nepal.

Ethical approval for the study was obtained from the Institutional Review Committee (IRC), Devdaha Medical College and Research Institute (DMCRI) (Ref. No. 1302/081/082).

Inclusion criteria were all adults (≥18 years) undergoing urological surgery requiring a urinary catheter. Patients with a suprapubic catheter, neurogenic bladder, trauma cases, pregnancy, emergency surgery, and unable to communicate were excluded.

The consecutive sampling method based on a questionnaire was used. A total of 156 patients were included in the study who provided informed written consent. With an odds ratio of 3.2 for the male gender, a significance level of 0.05, and a power of 0.9, a minimum of 154 patients were needed to have a statistically significant power of CRBD.[8]

Data were collected from patients in a structured proforma using a predetermined questionnaire in the post-operative care unit and the surgical ward of the institute, maintaining confidentiality and right to withdraw from the study at any time without any effect on hospital care, if the patients wished so. Details of the patient’s demographic profile, age, sex, type of operation and anaesthesia, duration of surgery, and Foley catheter size were recorded. The patient reported symptoms: no pain or discomfort, burning sensation, urge to void, agitation, and attempt to pull the Foley, were recorded twice on the day of surgery in post-operative ward and in the morning round the next day.

Catheter Related Bladder Discomfort Severity Scale (CRBD-SS) was recorded on the day of

surgery and on the first post-operative day. The CRBD-SS was recorded on grades as explained by the patient based on a predetermined questionnaire. PI and co-authors had fulfilled the records as per: Grade 1: no pain, Grade 2: mild pain (revealed only through patient interview), Grade 3: moderate pain (spontaneous complaints of a burning sensation in the urethra, an urge to urinate, or a foreign body sensation without agitation), and Grade 4: severe discomfort (agitation, loud complaints, and attempts to remove the bladder catheter, accompanied by a burning sensation in the urethra).

After completion of surgery, a Foley catheter with a size ranging from 14 to 20 Fr was inserted with standard technique. The Foley balloon was inflated by using 10 ml to 30 ml of distilled water and was fixed with tape laterally to the thigh. After shifting the patient from the operating theatre to the post-operative ward, the data were collected in the evening round. All patients were informed of how to distinguish bladder discomfort from postoperative pain in surgical ward after being included in research study. All patients were assessed in the post-anaesthesia care unit (PACU) on the day of surgery and the next day during morning rounds. If participants reported different grades during the round, the higher grade was taken during analysis.

The severity of bladder discomfort was assessed on a 4-point severity scale (grade):

1. No discomfort,
2. Mild (revealed only by interviewing the patient),
3. Moderate discomfort (complaint by the patient without interviewing) for burning sensation in urethra and/or an urge to urinate and/or sensation of urethral foreign body- without emotional agitation,
4. Severe discomfort (agitation, loud complaints, and attempt to remove the bladder catheter).

The data were entered into Microsoft Excel spreadsheet and analysed with SPSS (Statistical Package for Social Science) Version 20. Independent variables (age, sex, Foley catheter size, type and duration of surgery, and type of anaesthesia (general or spinal)) were analysed in number and frequencies. The dependent variables: Foley catheter related discomforts (burning sensation in the urethra, urge to urinate, sensation of urethral foreign body, agitation, and attempt to remove the bladder catheter associated with a burning sensation) were also analysed in number and frequencies and their relation were analysed by Chi-square test / Fisher's extract test. During analysis, a p-value <0.05 was considered statistically significant.

Result

A total of 156 patients were included in the study. Out of 156 cases, CRBD was observed in 113(72.4%). The mild, moderate, and severe grades of CRBD were 101(64.7%), 9(5.8%), and 3(1.9%) cases, respectively, Table 1.

Based on patient and surgical characteristics, patients aged >60 years had a significantly higher prevalence of CRBD (87.3%) than ≤60 years (64.4%, p=0.0017). No statistically significant associations were found between CRBD and sex, type of surgery, catheter size, or duration of surgery, Table 2.

The CRBD differed significantly according to the type of anaesthesia (p=0.014), highest incidence after general anaesthesia (75.8%), followed by spinal anaesthesia (71.0%). None of the 3 patients who received combined general and epidural analgesia reported CRBD, Table 3.

Male patients had a higher proportion of moderate and severe CRBD compared to females, though it was statistically not significant, Table 4.

Table 1: Severity of catheter related bladder discomforts (CRBD) in early post-operative period after urological surgery, n=156

CRBD severity	n	%
No CRBD	43	27.6
Mild	101	64.7
Moderate	9	5.8
Severe	3	1.9

Table 2: Association between patient and clinical characteristics with CRBD in early post-operative period after urological surgery, n=156

Variable	Category	Total n	CRBD Yes n(%)	CRBD No n(%)	p-value
Age group	≤60 years	101	65(64.4)	36(35.6)	0.0017
	>60 years	55	49(87.3)	6(12.7)	
Sex	Male	96	73(76.0)	23(24.0)	0.275
	Female	60	40(66.7)	20(33.3)	
Type of surgery	TURP	42	31(73.8)	11(26.2)	0.808
	Endourological*	106	76(71.7)	30(28.3)	
	Open surgery	8	5(62.5)	3(37.5)	
Catheter size	≤16 Fr	116	83(71.6)	33(28.4)	0.510
	>16 Fr	40	30(75.0)	10(25.0)	
Duration of surgery	≤60 minutes	70	53(75.7)	17(24.3)	0.418
	>60 minutes	86	60(69.8)	26(30.2)	

*PCNL, URS, RIRS

Table 3: Prevalence and severity of CRBD in early post-operative period after urological surgery under different anaesthesia type, n=156

Anaesthesia	Total n	CRBD No n(%)	CRBD Yes n(%)	CRBD Mild	CRBD Moderate	CRBD Severe	p-value
General (GA)	91	22(24.2)	69(75.8)	64	3	2	0.014
Spinal (SAB)	62	18(29.0)	44(71.0)	37	6	1	
GA + Epidural	3	3(100)	0	0	0	0	

Table 4: Prevalence and severity of CRBD by sex in early post-operative period after urological surgery, n=156

Sex	Total n	CRBD, No n(%)	CRBD, Yes n(%)	CRBD Mild	CRBD Moderate	CRBD Severe
Male	96	23(24.0)	73(76.0)	61	9	3
Female	60	20(33.3)	40(66.7)	40	0	0

Discussion

The overall prevalence of CRBD we observed was 72.4%. The higher prevalence was statistically significant in older age group, over 60 years, and surgery performed under general anaesthesia.

The present study found a high overall prevalence of CRBD in 113/156(72.4%), consistent with previous reports ranging from 20% to 85% depending on surgical type and patient population.[9,10] This highlights CRBD as a common and clinically significant postoperative complication. Similar to our study, the higher prevalence of CRBD was reported in urological surgeries other than general and gynaecological/obstetrics surgeries.[11] The similar higher CRBD incidence in previous studies highlights the complexity of factors contributing to CRBD. Many variables, such as patient characteristics, surgical procedures, and perioperative care practices, also play significant roles.[12]

The urinary bladder receives cholinergic innervation by the pelvic nerves and adrenergic innervation by the hypogastric nerve. The M2 muscarinic receptors predominantly and a lesser degree M3 receptors are predominantly related to the contraction of detrusor smooth muscles.[5] The cysto-urethral junction, trigone, and urethral sphincter are also supposed to be key factors responsible for CRBD.[13] The CRBD can lead to patient dissatisfaction in the postoperative period and increased incidence of postoperative complications.[14]

Age emerged as a significant predictor of CRBD. In the present study, patients aged >60 years had a markedly higher prevalence (87.3%) compared to those ≤60 years (64.4%, p=0.0017), in line with prior studies,[8] indicating increased susceptibility among older adults, likely due to age-related changes in bladder compliance and sensory function.[15]

In our study, the gender difference was observed in the prevalence of CRBD, with 76% of male patients and 66.7% of female patients, but this was not statistically significant (p=0.275). Our findings did not support a significant gender-based disparity contrary to another study suggesting a higher incidence in males.[16] This might be due to the gender alone may not consistently influence CRBD. This discrepancy may be due to variations in study populations (demographic conditions and patient-related factors such as comorbidities) and the methodology used. After sub-analysing the severity grades, our study showed that in males, 23/96 (24.0%) had no CRBD, 61/96 (63.5%) had mild, 9/96 (9.4%) had moderate, and 3/96 (3.1%) had severe CRBD. Similar to our study, another study reports that male patients had a higher prevalence of a severe form of CRBD.[17]

The present study didn't show a statistically significant of CRBD according to the type of surgical procedure. The cases undergoing transurethral resection of the prostate (TURP) had a prevalence of 75.6%, those undergoing other endourological procedures (PCNL, URS, RIRS) had a prevalence of 71.6%, and those undergoing open surgeries had a prevalence of 62.5%, respectively. These differences were not statistically significant (p=0.808). Previous studies have also reported varying incidences of CRBD across different surgical procedures, with no consistent pattern.[14] This suggests that factors other than the type of surgery may play a substantial role in the development of CRBD.

Our study observed that the catheter sizes (≤16 Fr vs. >16 Fr) were also not significantly associated with CRBD (71.5% vs. 66.7%, p=0.51). This finding contrasts with some studies suggesting that larger catheter sizes are associated with a higher incidence of CRBD.[16,18,19] The rates 71.5% vs. 66.7% for catheter size ≤16 Fr vs. >16 Fr were notably higher, suggesting that other factors beyond catheter size may contribute to the discomfort. The lack of a significant association in our study may be due to the overall higher incidence of CRBD, relatively small subpopulation, and only included urological surgical procedures.

In relation to the duration of surgery, there were 70 cases with duration ≤60 minutes, among them 53(75.7%) had CRBD, in contrast

to 86 cases with duration of >60 minutes showing CRBD in 60(69.7%) cases. Since the p-value >0.05, the difference in CRBD incidence between surgeries lasting ≤60 minutes and >60 minutes was not statistically significant, which is similar to another recent study.[20] These finding suggests that the various factors other than the duration of surgery are responsible for CRBD.

The pathophysiology of CRBD involves bladder irritation caused by indwelling catheters, resulting in involuntary detrusor contractions and discomfort.[21,22] In our study type of anaesthesia emerged as a significant factor influencing the incidence of CRBD in our study. We observed a high prevalence of CRBD in patients receiving general anesthesia75.8%) or spinal anesthesia71.0%), whereas none of the three patients who received combined general and epidural analgesia reported CRBD. Although the sample size for the epidural group is small, this finding aligns with previous studies suggesting that neuraxial analgesia, particularly continuous epidural blockade, may exert a protective effect against bladder discomfort.

The proposed mechanism is twofold: first, epidural local anaesthetics block the sacral afferent nerve fibres (S2–S4) responsible for transmitting nociceptive and discomfort signals from the bladder trigone and urethra; second, they may reduce detrusor overactivity by modulating parasympathetic efferent activity.[13,21] This is supported by literature indicating that epidural analgesia reduces postoperative urinary retention and related discomfort.[17] The complete absence of CRBD in this subgroup, while requiring validation in larger studies, suggests that the duration and level of sensory blockade may be critical in mitigating catheter-induced bladder irritation.

Future prospective studies comparing different analgesic regimens—including epidural analgesia, pudendal nerve blocks, and systemic medications such as anticholinergics or alpha-2 agonists—are warranted to establish optimized, multimodal strategies for CRBD prevention in urological surgical patients [23]

Our study has some limitations; being a single-institution-based study, the findings may not represent the diverse population and scenario for generalizability. Additionally, the study did not account for potential confounding factors such as the duration of catheterization, the use of medications, and the presence of co-morbidities of the patients.

Conclusion

We observed a high prevalence (72.4%) of catheter-related bladder discomfort following urological surgeries. Age ≥60 years and type of anaesthesia were significantly associated with discomfort, whereas gender, surgical type, duration of surgery, and catheter size were not statistically correlated with CRBD prevalence rate. The catheter-related bladder discomfort is determined by multiple factors.

Author contribution

Concept design: PR, JNS; Literature search: PR, CKS; Data analysis: PR; Draft manuscript: ALL; Final approval: ALL

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Conflict of interest

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Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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