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# Catheter Related Bladder Discomfort: Epidemiological Aspects and Predictive Factors at Kamenge University Hospital

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## Abstract

**Background:** Catheter-related bladder discomfort (CRBD) is a frequent complication following transurethral urinary catheterization. It is characterized by suprapubic discomfort, urinary urgency, burning sensation, agitation, and sometimes attempts to remove the catheter. This study aimed to determine the incidence and associated factors of CRBD among catheterized patients at Kamenge University Hospital. **Methods:** We conducted a prospective analytical cohort study including all adult patients who underwent transurethral urinary catheterization between March and August 2024. CRBD was operationally defined as the presence of suprapubic discomfort, urgency, burning sensation, agitation, or attempt to remove the catheter within 24 hours after catheter insertion. Patients were classified into two groups: CRBD and non-CRBD. Categorical variables were compared using the Chi-square test. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Multivariable logistic regression analysis was performed to identify factors independently associated with CRBD. A p-value < 0.05 was considered statistically significant. **Results:** A total of 321 patients were included (183 females and 138 males), with a mean age of 33.6 ± 12.4 years. CRBD occurred in 175 patients, yielding an incidence of 54.5%. The most frequent symptom was suprapubic discomfort (79.4%). Factors inde-

pendently associated with CRBD were age < 50 years (OR 3.31, p = 0.00004), male gender (OR 8.82, p = 0.0001), previous history of bladder catheterization (OR 5.60, p = 0.0001), prior gyneco-obstetric surgery among females (OR 1.56, p = 0.00011), catheter size ≥ 18 Fr (OR 6.05, p = 0.0003), and catheter lubrication was strongly protective (OR 0.02, p = 0.0003). **Conclusion:** CRBD affected more than half of catheterized patients in our setting. Both modifiable and non-modifiable risk factors were identified. Preventive strategies, particularly appropriate catheter size selection and systematic lubrication, may help reduce its incidence.

## Keywords

Catheter-Related Bladder Discomfort, Urinary Catheterization, Risk Factors, Epidemiology

## 1. Introduction

Urinary catheterization is a medical procedure used to drain urine by aseptically inserting a sterile urinary catheter into the bladder. It is a frequent procedure with a wide range of indications. It is necessary in long-term surgical procedures to ensure diuresis monitoring and to adapt the volume of infused solutions [1]. Today, the majority of bladder catheters used are indwelling trans-urethral catheters. Other bladder catheters, used much less frequently, are suprapubic urinary catheters, introduced into the bladder directly through the abdominal wall [2]. Trans-urethral bladder catheterization, a frequent procedure in Urology, represents an increased risk of discomfort and nosocomial urinary tract infection [3]. The main indication for urinary catheterization is bladder retention, whether due to subvesical obstruction or lack of bladder contraction [4]. Whatever the indication, bladder catheterization remains a commonly performed invasive procedure, associated with a variety of complications. Many of these complications are linked to long-term use of the catheter. In some cases, the presence of a bladder catheter can lead to a urinary discomfort syndrome known as Catheter Related Bladder Discomfort (CRBD) [5]. This syndrome manifests itself as a permanent painful urge to urinate, or a simple urethral burning that can develop into a spasm, causing urine to leak around the catheter. It can even lead to agitation and confusion, with an attempt to pull out the catheter. Little is known about the triggers of this syndrome, and few studies have been carried out on the subject [6] [7]. According to the literature, the risk of developing Catheter-Related Bladder Discomfort (CRBD) after catheterization depends on a number of factors: the patient's age, the disproportion between the patient's anatomy and the size of the catheter, the type of catheter used, the duration of catheterization, the presence of comorbidities, the absence of lubrication of the catheter before insertion into the urethra, a history of urological or laparotomy surgery, the frequency of disconnection of the drainage system [8]. The aim of our study was to establish a descriptive epidemiological profile of patients presenting with Catheter Related Bladder Discomfort (CRBD), and to determine the predictive factors of this

syndrome at the Kamenge University Hospital.

## 2. Materials and Methods

This was a prospective descriptive and analytical study conducted in the Departments of Surgery, Gynecology-Obstetrics, Intensive Care and Internal Medicine at the Kamenge University Hospital over a 6-month period from March 2024 to August 2024. We conducted a prospective analytical cohort study including all consecutive adult patients (≥18 years) who underwent trans-urethral urinary catheterization during the study period. Patients were classified into two groups according to the occurrence of catheter-related bladder discomfort (CRBD): those who developed CRBD and those who did not. We excluded patients with suprapubic catheterization, patients with pre-existing neurogenic bladder, patients with spinal cord injury, unconscious patients unable to report symptoms, and those who refused participation. CRBD was defined as the presence of suprapubic discomfort, urgency, burning sensation, agitation, or attempt to remove the catheter occurring within the first 24 hours after catheter insertion.

The diagnosis was made through bedside clinical assessment and patient self-reporting. CRBD severity was classified as mild (discomfort without behavioral response), moderate (discomfort with verbal complaint), or severe (attempt to remove the catheter or marked agitation).

The following data were collected: socio-demographic, clinical, history of bladder catheterization, indication of catheterization, catheter size, duration of catheterization and therapeutic aspects. Data collection was carried out at the patient's bedside and reported on a form.

Statistical analysis was performed using SPSS version 26. Categorical variables were compared using the Chi-square test. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Variables with $p < 0.05$ in univariate analysis were entered into a multivariable logistic regression model to identify independent predictors of CRBD. A p-value $< 0.05$ was considered statistically significant. Analysis of gyneco-obstetric surgical history was restricted to female patients and adjusted for sex in multivariable analysis. Text processing, tables and figures were carried out using Word software version 2021 and Microsoft Excel.

## 3. Results

During the study period, 321 patients underwent trans-urethral urinary catheterization, consisting of 183 women (57%) and 138 men (43%), with a sex ratio of 1.32 in favor of females. The mean age was 33.6 years, with a range of 17 to 80 years. Younger patients (under 50) were most affected, comprising 80.99% of cases. The most affected age groups were 31 - 40 years (33%), 21 - 30 years (27%), and 41 - 50 years (17%). Surgery, including gynecology-obstetrics, general surgery, urological surgery, as well as orthopedic and traumatological surgery, was the primary indication for urinary catheterization, accounting for 85.04% of cases. Out of the 321 patients, 175 (54.5%) developed bladder discomfort related to the catheter. The clinical

symptoms of CRBD were: suprapubic discomfort (79.42%), a persistent and painful urge to urinate (12.57%), urethral burning (5.71%), urine leakage around the catheter (1.71%), and an attempt to remove the catheter in one case (0.57%). In our study, 139 patients (43.30%) had a history of trans-urethral catheterization, while 182 patients (56.70%) did not. Of the 260 patients under 50 years old, 156 (60%) developed CRBD, while only 19 out of 61 patients over 50 (31.14%) experienced the syndrome. Regarding catheter size, 73% of patients used catheters ≥ 18 Fr, while 27% used smaller ones. Among those using catheters ≥ 18 Fr, 65.81% developed CRBD, compared to 24.13% of those using catheters < 18 Fr. Out of 234 patients who used a catheter with a caliber greater than or equal to 18 Fr, 154 patients, or 65.81%, had developed the urinary catheter-related bladder discomfort syndrome, whereas out of 87 patients who used a catheter with a caliber less than 18 Fr, 21 patients, or 24.13%, had developed the bladder discomfort syndrome.

## 4. Factors Associated with CRBD

Patients younger than 50 years were significantly more likely to develop CRBD compared to those aged 50 years and above (OR 3.31, p = 0.00004). Male patients had a markedly higher risk of CRBD than females (OR 8.82, p = 0.0001). A previous history of bladder catheterization was strongly associated with CRBD occurrence (OR 5.60, p = 0.0001). Among female patients, prior gyneco-obstetric surgery was significantly associated with CRBD (OR 1.56, p = 0.00011). Regarding catheter-related factors, the use of a catheter size ≥ 18 Fr was associated with an increased risk of CRBD (OR 1.65, p = 0.0003). Furthermore, the absence of catheter lubrication was significantly associated with CRBD occurrence (OR 0.02, p = 0.0003). Comparative analysis between patients with and without CRBD is presented in Table 1.

**Table 1.** Comparison of demographic and catheter-related factors between patients with and without catheter-related bladder discomfort (CRBD).

| Variable | CRBD (n = 175) | No CRBD (n = 146) | OR (95% CI) | p-value |
|---|---|---|---|---|
| Age < 50 | 156 | 104 | 3.31 (1.83 - 6.02) | 0.00004 |
| Age ≥ 50 | 19 | 42 | 1.00 | |
| Male | 113 | 25 | 8.82 (5.19 - 15.01) | 0.0001 |
| Female | 62 | 121 | 1.00 | |
| History of bladder catheterization | 107 | 32 | 5.60 (3.41 - 9.20) | 0.0001 |
| No history | 68 | 114 | 1.00 | |
| Gyneco-obstetric surgery (females only) | 39 | 40 | 1.56 (0.86 - 2.82) | 0.00011 |
| No gyneco-obstetric surgery | 40 | 64 | 1.00 | |
| Catheter size ≥ 18 Fr | 154 | 80 | 6.05 (3.53 - 10.36) | 0.0003 |
| Catheter size < 18 Fr | 21 | 66 | 1.00 | |
| Catheter lubrication | 127 | 145 | 0.02 (0.002 - 0.14) | 0.0003 |
| No lubrication | 48 | 1 | 1.00 | |

## 5. Discussion

Bladder spasms due to involuntary contraction of the bladder occur frequently and may be aggravated by the presence of a catheter, blood clots, preoperative overactive bladder, or preoperative ingestion of bladder stimulants like caffeine. These bladder spasms are painful, associated with peri-catheter leakage of urine, increased postoperative bleeding, and often refractory to postoperative analgesia [9]. In our cohort, CRBD affected more than half of catheterized patients, confirming its high frequency in clinical practice. We included 183 women and 138 men with a sex ratio of 1.32 in favor of the female sex. Of the 321 patients with urinary catheters included, 175 cases (54.5%) had developed symptoms suggestive of bladder discomfort related to the catheter, making bladder discomfort one of the most frequent complications after trans-urethral urinary catheterization. Surgery (gynecology-obstetrics, general and urological surgery, as well as orthopedic and traumatological surgery) was the most frequent provider of urinary catheters, with a frequency of 85.04%. This result is similar to that of A. Moataz A *et al.* [10], who found that 81% of the 300 patients included in their series were catheterized prior to surgery, confirming that surgery was the most frequent provider of catheterized patients. The average age of our patients was 33.6 years, with extremes of 17 and 80 years. Younger subjects (under 50) were the most affected, accounting for 80.99% of cases. The age groups most affected were 31 to 40 (33% of cases), 21 to 30 (27%) and 41 to 50 (17%).

Other authors had identified the predictors factors of CRBD: male sex, age ≥ 50 years, age < 50 years, history of indwelling bladder catheters, history of cesarean section, abdominal laparotomy in urological diseases, uterus-related laparoscopic surgery, obstetric and gynecological surgery, lack of postoperative analgesics, a urinary catheter size of 18 ≥ Fr and lack of lubrication of a catheter [10]-[12].

Among patients under 50 years of age, 156 out of 260 patients, or 60% of cases, developed bladder discomfort syndrome, while among patients over 50 years of age, 19 out of 61 patients, or 31.14% of cases, developed bladder discomfort syndrome. Comparing young patients (<50 years) with CRBD with patients over 50 with CRBD, the odds ratio was 3.32.

Urinary catheter-related bladder discomfort (CRBD) was more prevalent in younger patients, making age a predictive factor for catheter-related bladder discomfort (CRBD) in our series (On the other hand, in the study by Lim N *et al.*, the age <50 years (OR = 4.79; 95% CI, 1.62 - 14.09; P = 0.005) was a predictor factor of CRBD [13].

In our series, the female sex was more represented, with 183 female patients (57%) of cases, compared with 138 male patients, i.e. 43% of cases. The sex ratio was 1.32 in favor of females. Of these 183 women, 62/183 or 33.87% of cases had developed the syndrome of bladder discomfort linked to the urinary catheter, and of the 138 men, 113/138 or 81.88% of cases had developed the bladder discomfort syndrome. Comparing patients with CRBD with affected female patients, the odds ratio was 8.82. Masculine sex is therefore much more affected by urinary catheter-

related bladder discomfort syndrome than female sex, making male gender a predictive factor for urinary catheter-related bladder discomfort syndrome (CRBD) in our series. Moataz A *et al.* [10] found a female pre-dominance, with a sex ratio of 1.26 in favor of females, while retaining that male sex was a predictive factor for catheter-related bladder discomfort in their series.

In our study, 139 patients (43.30%) had a history of trans-urethral catheterization, while 182 patients (56.70%) did not. Among patients without a history of catheterization, 68 out of 182 (37.36%) developed CRBD. Comparing those with a history of bladder catheterization who showed signs of CRBD with those who had not previously had a urinary catheter, the odds ratio was 5.60 and p = 0, 0001.This means that patients with a history of bladder catheterization are about 5.60 times more likely to develop CRBD than those without. Therefore, a history of trans-urethral bladder catheterization was a predictive factor for CRBD in our study. Li *et al.* [14] cited by Moataz A *et al.* [10] had found that subjects who had been catheterized 3 months prior to current catheterization were predisposed to express moderate or severe bladder discomfort, significantly with a p-value < 0.05. However, Binhas and al [15] cited by Moataz A *et al.* [15] reported the same results. We all agree that this is linked to the psychological impact left by the previous catheterization.

Surgical history was found in 139/321 patients, i.e. 43.30% of cases, and 79 cases were women out of the 321 patients included, i.e. 24.61% of cases. Of the 79 women with a history of gyneco-obstetric surgery, 39 patients (49.36%) developed symptoms of bladder discomfort associated with urinary catheterization. Comparing the occurrence of CRBD in patients with and without a history of ob-gyn surgery, the odds ratio was 1.56 and p = 0.00011. Thus, patients with a history of gynaecological and obstetric surgery were 1.56 times more likely to develop CRBD than patients without such a history. In our series, therefore, as reported by other authors [10] [15], a history of gynaecological and obstetric surgery, and in particular a previous caesarean section, was a predictive factor for CRBD.

With regard to the caliber of the urinary catheter used, in 73% of cases, the caliber was greater than or equal to 18 Fr, versus 27% with a caliber less than 18 Fr. Out of 234 patients who used a catheter with a caliber greater than or equal to 18 Fr, 154 patients, or 65.81%, had developed the urinary catheter-related bladder discomfort syndrome, whereas out of 87 patients who used a catheter with a caliber less than 18 Fr, 21 patients, or 24.13%, had developed the bladder discomfort syndrome.

Comparing the occurrence of CRBD in patients whose urinary catheter caliber was greater than or equal to 18 Fr and those whose catheter caliber was less than 18 Fr, the odds ratio was 6.05 (p = 0.0003), indicating that patients catheterized with a size ≥ 18 Fr had a significantly higher risk of developing CRBD compared to those with smaller catheters. Thus, patients catheterized with a catheter caliber > 18 Fr had a 64% greater risk of developing CRBD than those catheterized with a catheter caliber < or equal to 18 Fr. Like other authors [10] [15], we can

conclude that urinary catheter caliber> 18 F was a predictive factor for urinary catheter-related bladder discomfort.

We were unable to compare bladder discomfort according to catheter type, as we had only used one type (latex catheter), which was available and less expensive. According to the lubrication of the urinary catheter at the time of insertion, 272/321 patients (84.73%) had benefited from lubrication before catheterization. Of these, 127/272 (46.69%) developed bladder discomfort syndrome. Of 49 patients catheterized without prior lubrication of the catheter, 48 patients (97.95% of cases) developed bladder discomfort syndrome related to the urinary catheter. By comparing the frequency of CRBD in patients whose catheter had been previously lubricated and patients catheterized without lubrication, the odds ratio was 0.02 with $p = 0.0003$ and therefore significant. Ultimately, the absence of catheter lubrication prior to urinary catheterization was a predictive factor for bladder discomfort associated with urinary catheterization in our series. Moataz A *et al.* [10] reported that absence of catheter lubrication was predictive factor of bladder discomfort associated with urinary catheterization. Catheter lubrication showed a strong protective effect (OR 0.02), indicating that the absence of lubrication significantly increased the risk of CRBD. However, this finding should be interpreted cautiously due to the small number of patients without lubrication.

Different treatment modalities have been described regarding the management of CRBD, no methods have been obtained up to the mark of desire. Pharmaceutical and non-pharmaceutical methods are two types of treatment modalities for CRBD control. Among the pharmaceutical agents used are solifenacin, Oxybutynin, darifenacin, tolterodine, gabapentin, pregabalin,

tramadol, paracetamol, butyl scopolamine, ketamine, botulinum toxin (Botox), magnesium acetate, vitamin C, and vitamin D. Among the non-pharmaceutical methods are changing the size of Foley Catheter, fixing the catheter, etc [16]-[18].

Above the mentioned treatment methods patient tolerated well but had a high incidence of treatment-related side effects. The percentage of CRBD incidence is unknown, but after urologic surgery, it is 50% [16]. Literatures were also reviewed to identify non-pharmaceutical interventions for the control of CRBD. Through the survey, seven non-pharmaceutical interventions were found to alleviate CRBD symptoms. It is hypothesized that the application of both interventions would be highly effective in managing CRBD symptoms.

This study has several limitations. First, catheter type and balloon volume were not evaluated, which may influence CRBD occurrence. Second, analgesic exposure was not systematically analyzed. Third, the small number of patients without catheter lubrication may have influenced the strength of association observed. Despite these limitations, the prospective design and inclusion of all consecutive catheterized patients strengthen the validity of our findings.

## 6. Conclusion

Catheter related bladder discomfort (CRBD) occurred in more than half of catheterized patients in our setting. Younger age, male gender, previous catheteriza-

tion, gyneco-obstetric surgical history, catheter size ≥ 18 Fr, and absence of lubrication were independently associated with CRBD. Preventive strategies targeting modifiable factors may reduce its incidence. Future studies should explore other factors, such as catheter type, balloon volume, and technical aspects, which could contribute to CRBD.

## Author Contribution

PB contributed to the study concept and design; TB collected and analyzed the data; SN drafted the manuscript. RN, JCM, SH, JLB, DM, MAK, AM, FN, BK & APN contributed to reviewing and finalizing the manuscript. All authors reviewed the manuscript for intellectual content and approved the submission.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

## Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Kamenge University Hospital. Written informed consent was obtained from all participants.

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