

# Effects of Different Urinary Catheterization Practices on Urinary Complications and Quality of Life

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Submitted: 2025-01-06

Accepted: 2025-02-25

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**Abstract**

**Objective:** This study investigates the effects of different urinary catheterization methods—transurethral catheterization (TC), suprapubic catheterization (SC), and clean intermittent catheterization (CIC)—on urinary complications and quality of life.

**Material and Methods:** This research conducted as a descriptive design with 91 patients at a urology clinic in Istanbul between November 2023 and September 2024, the research evaluates catheterization-related complications and their impact on patients' emotional, social, and physical well-being over a six-month period. Data collection utilized the Patient Information Form and the King's Quality of Life Questionnaire.

**Results:** Indicate that while all methods present complications such as urinary tract infections (UTIs), urgency, and hematuria, CIC and SC showed significant reductions in UTI rates over time ( $p=0.001$  and  $p=0.042$ , respectively). CIC also resulted in fewer cases of hematuria compared to other methods ( $p=0.039$ ). In terms of quality of life, SC demonstrated improvements in emotional and social domains over six months, whereas CIC offered enhanced autonomy and better physical health outcomes. Transurethral catheterization, despite its widespread use, was associated with higher complication rates, particularly UTIs.

**Conclusion:** The findings underscore the importance of individualized catheterization decisions as based on multidisciplinary team approach and emphasize the critical role of nursing in following patient outcomes. Comprehensive patient education and adherence to hygiene protocols were instrumental in reducing complications and enhancing quality of life. Future studies should explore the long-term implications of these catheterization methods and further assess the role of nursing interventions in improving patient care.

**Keywords:** clean intermittent catheterization, transurethral catheterization, suprapubic cystostomy, complications, quality of life

## INTRODUCTION

Urinary catheterization is the process of draining urine stored in the bladder using a catheter (1). Urinary catheterization is performed in two different ways, transurethral permanent catheterization and clean intermittent catheterization, depending on the purpose of use and the needs of the patient (2). Transurethral indwelling catheterization is one of the most frequently performed procedures in hospitals, as it is performed in approximately 25% of hospitalized patients (3). Clean intermittent catheterization (CIC) is a preferred method for emptying the bladder instead of long-term indwelling catheterization in patients who develop bladder dysfunction due to various reasons (1, 4)

Indwelling catheterization is applied to the bladder via the urethral or suprapubic route. The application of the catheter to the bladder via the urethral route is called urinary catheterization (bladder catheterization). Suprapubic catheterization is usually preferred after bladder, urethral surgery, pelvic surgery or genitourinary trauma. Suprapubic catheterization has some advantages over urinary catheterization, such as increasing the individual's independence, facilitating participation in sexual activities, and reducing the risk of some complications such as epididymitis (5, 6). (CIC) is considered a safe and effective catheterization method that supports the independence of the individual's bladder function, reduces the negative impact on daily life activities, and results in improvements in the individual's body image, self-confidence, and quality of life (5, 7). While the decision to apply or remove a urinary catheter is made by the physician, clinical nurses are responsible for the application, removal and routine care of the catheter (8). In CIC practices, nurses have an important role in teaching and providing the patient/caregiver with catheterization skills during the hospital/home care process (4, 7).

Correct catheter application, care and catheterization training play a fundamental role in eliminating these problems that negatively affect the patient's quality of life and motivation to comply with treatment (5). When the literature was reviewed, no study was found that examined the effects of different urinary catheterization practices on urinary complications and quality of life. This study was conducted to examine the effects of different urinary catheterization practices on urinary complications and quality of life.

## MATERIAL AND MEDHODS

### Design of Study

This study was conducted as a descriptive and correlational research to investigate the effects of different urinary catheterization practices on urinary complications and quality of life.

The study was conducted with 91 patients who applied to the urology clinic of a city hospital in Istanbul between November 2023 and September 2024, who were applied transurethral catheter or suprapubic catheter and applied clean intermittent catheterization. The study was approved by the ethics committee (258/2023). Written informed consent was obtained from each patient and the study was designed in accordance with the Declaration of Helsinki.

The study included patients aged 18 years and over, who were applied indwelling transurethral catheter or suprapubic catheterization for the first time due to urinary retention, and who had just started clean intermittent catheterization. Patients who were hospitalized for other reasons and who had upper extremity coordination disorders that would prevent them from performing CIC were not included in the study.

### Data Collection Forms

Data were collected using the Patient Information Form and the King's Quality of Life Questionnaire.

**Patient Information Form:** This form was prepared by the researcher in light of the literature to determine the factors affecting the patients' catheterization-related problems (4). The Patient Information Form consisted of two sections including questions aimed at determining individual characteristics and characteristics that may affect the application. The first section included questions aimed at determining the patient's age, gender, education level, marital status and chronic disease status, and the second section included questions aimed at determining the type of catheterization applied, the number of times CIC will be applied per day, the type of catheter used, the need for assistance from others in daily life and complications associated with catheterization.

**King's Quality of Life Questionnaire:** The adaptation study of the questionnaire developed in 1997 at the King's College Hospital (London) (9) to the Turkish society was carried

out by Akkoç et al. (10). It consists of 21 questions and 8 sections that question general health perception, the effect of urination complaints on the patient's life, daily life activities, social and private life restrictions, mood, sleep patterns and behaviors related to urinary incontinence. However, there is also a section that questions the patient's symptoms related to urinary voiding. With this question, the effect and severity of bladder problems on the patients are questioned under subheadings. These are; pollakiuria, nocturia, sudden urge, sudden urge incontinence, stress incontinence, nocturnal enuresis, incontinence during sexual intercourse, frequent urinary tract infection and pain in the bladder. All questions are evaluated out of 4 points. The lowest score that can be obtained from the questionnaire is 0; the highest score is 100. A high score indicates a level of complaints that leads to greater deterioration in quality of life.

### Implementation of the Research

Patients who underwent transurethral catheterization were monitored by the research physician by periodically changing the 16-18 Fr Foley catheter (20-30 days interval). CIC training was given to patients who started clean intermittent catheterization in a urodynamics room where CIC could be performed and where patient privacy was appropriate. The training lasted approximately 20 minutes and was given by the research physician and nurse, along with the verbal training included in routine practice and video-supported CIC training. The video prepared by the research nurse in accordance with the European Association of Urology Nurses (EAUN) Society of Urologic Nurses and Associates (SUNA) CIC practice guidelines was used.

Suprapubic cystostomy was performed under local anesthesia, under ultrasound guidance, using a percutaneous cystostomy catheter kit, with a catheter placement of 14-16fr at the time the bladder was optimally full (mean 300 ml). The suprapubic catheter was changed under local anesthesia at 20-30 days.

After the information, patients were asked to answer the Patient Information Form and King's Quality of Life Questionnaire. In the clinical routine, patients were asked to answer the Patient Information Form and King's Quality of Life Questionnaire at the 1st, 3rd and 6th month follow-ups when they came to the outpatient clinic for routine follow-up.

### Statistical Analysis

All data were analyzed using SPSS 21.0 statistical software for Windows (SPSS, Chicago, IL, USA). Results are reported as mean  $\pm$  SD. All continuous variables were checked with Kolmogorov-Smirnov normality test to show normality of distributions. Comparisons between groups were evaluated with independent sample t-test, Mann-Whitney U test, ANOVA test and chi-square test. Statistical significance was accepted as  $p < 0.05$ .

For the sample analysis of the study, it was planned to include at least 29 patients in each group with 80% reliability and 5% margin of error, taking the satisfaction scores in the study conducted by Lavelle et al. as an example (11).

### RESULTS

The research was conducted with 91 patients who applied to the Urology Clinic of a City Hospital. Of the patients included in the study, 30 had been applied transurethral catheterization (TC), 31 been applied suprapubic cystostomy (SC), and 30 applied when the characteristics of the patients included in the study were examined, the mean age was  $53.14 \pm 9.80$  years, 54.9% were male, the mean BMI was  $25.01 \pm 4.65$ , 70.3% were married, 52.7% did not have a chronic disease and 67% did not need anyone's help in performing their daily living activities. No significant difference was found between the groups in terms of individual characteristics ( $p > 0.05$ ) (Table-1).

In the first month of follow-up, 31 patients had UTI, 22 had urgency, 29 had incontinence, 33 had hematuria, and 16 had urethral stricture. Of these complications, the frequency of UTI, urgency, incontinence, and hematuria decreased over time, while the frequency of urethral stricture increased. When the catheter-related complications of the patients were examined, it was found that the rate of urinary system infection in the sixth month in patients who underwent suprapubic catheterization and clean intermittent catheterization decreased statistically significantly compared to the first and third months ( $p = 0.042$  for SC and  $p = 0.001$  for CIC). On the other hand, the rate of hematuria in the third month was significantly lower in patients who underwent clean intermittent catheterization compared to the patients in the other group ( $p = 0.039$ ). No significant difference was observed between the groups in terms of other complications ( $p > 0.05$ ) (Table-2).

**Table 1.** Individual and Disease Characteristics of Patients (N=91)

Characteristics		Total (n=91)	Transurethral catheterization (n=30) n (%)	Suprapubic catheterization (n=31) n (%)	Clean intermittent catheterization (n=30) n (%)	p
Age		53.14±9.80	53.17±10.35	53.23±10.02	53.03±9.34	0.997
Gender	Female	41(45.1%)	13(43.3%)	14(45.2%)	14(46.7%)	0.068
	Male	50(54.9%)	17(56.7%)	17(54.8%)	16(53.3%)	
Height (cm)		169.12±8.93	169.37±9.36	168.90±8.83	169.10±8.94	0.980
Weight (kg)		70.96±10.34	72.23±10.92	70.32±10.08	70.33±10.25	0.756
BMI		25.01±4.65	25.38±4.78	24.87±4.70	24.78±4.59	0.868
Marital status	Married	64(70.3%)	23(76.7%)	21(67.7%)	20(66.7%)	0.399
	Single	27(29.7%)	7(23.3%)	10(32.3%)	10(33.3%)	
Educational Status	Primary	61(67%)	19(63.3%)	23(74.2%)	19(63.3%)	0.672
	High school	26(28.6%)	9(30%)	7(22.6%)	10(33.3%)	
	University	4(4.4%)	2(6.6%)	1(3.2%)	1(3.3%)	
Presence of chronic diseases	Yes	43(47.3%)	15(50%)	14(45.2%)	14(45.2%)	0.928
	No	48(52.7%)	15(50%)	17(54.8%)	16(52.7%)	
Needing help from others in daily life	Yes	30(33%)	5(16.7%)	11(35.4%)	14(46.7%)	0.044
	No	61(67%)	25(83.3%)	20(64.5%)	16(53.3%)	

ANOVA test

**Table 2.** Comparison of Complications of Catheterization in Patients Between Groups

Complications	Group	First Month (1)* n(%)	Third Month (2)* n(%)	Sixth Month (3)* n(%)	p
Urinary System Infection	Transurethral catheterization	9(30%)	9(30%)	5(16.7%)	0.449
	Suprapubic catheterization	11(35.5%)	13(41.9%)	5(16.1%)	<b>0.042</b>
	Clean intermittent catheterization	13(43.3%)	11(36.7%)	2(6.7%)	<b>0.001</b>
		0.558	0.593	0.435	
Urgency	Transurethral catheterization	9(30%)	7(23.3%)	5(16.7%)	0.301
	Suprapubic catheterization	8(25.8%)	5(16.1%)	2(6.5%)	0.121
	Clean intermittent catheterization	5(16.7%)	4(13.3%)	2(6.7%)	0.467
		0.230	0.576	0.316	
Urinary Incontinence	Transurethral catheterization	7(76.7%)	8(26.7%)	5(16.7%)	0.671
	Suprapubic catheterization	11(35.5%)	12(38.7%)	8(25.8%)	0.322
	Clean intermittent catheterization	11(36.7%)	11(36.7%)	7(23.3%)	0.109
		0.470	0.571	0.673	
Hematuria	Transurethral catheterization	10(33.3%)	11(36.7%)	10(33.3%)	0.899
	Suprapubic catheterization	13(41.9%)	8(25.8%)	6(19.4%)	0.233
	Clean intermittent catheterization	10(33.3%)	4(13.3%)	6(20%)	0.344
		0.721	<b>0.039</b>	0.359	
Urethral Stricture	Transurethral catheterization	4(13.3%)	5(16.7%)	6(20%)	0.761
	Suprapubic catheterization	4(12.9%)	8(25.8%)	8(25.8%)	0.488
	Clean intermittent catheterization	8(26.7%)	10(33.3%)	8(26.7%)	0.812
		0.455	0.140	0.806	

Chi-square test

**Table 3.** Comparison of King Health Survey Mean Scores in Patients Between Groups

Survey	Group	First Month (1) <sup>*</sup>		Third Month (2) <sup>*</sup>		Third Month (3) <sup>*</sup>		P
		Mean	SD	Mean	SD	Mean	SD	
KHQ-General Health	Transurethral catheterization	34.17	20.218	39.17	19,35	33,33	23,057	0.808
	Suprapubic catheterization	37.90	23.158	36.29	25,69	34,68	22,058	0.762
	Clean intermittent catheterization	32.50	25.554	35.00	23,30	35,00	25,931	0.351
		0.646		0.772		0.959		
KHQ-Incontinence Impact	Transurethral catheterization	62.22	28.68	58.89	28,61	60,00	30,83	0.639
	Suprapubic catheterization	58.06	30.99	55.91	32,65	59,14	30,68	0.465
	Clean intermittent catheterization	55.56	33.14	61.11	29,14	60,00	30,83	0.322
		0.703		0.797		0.992		
KHQ-Role limitation	Transurethral catheterization	53.33	14.12	47.22	17,00	51,11	15,12	0.558
	Suprapubic catheterization	46.77	15.76	55.38	11,70	45,70	16,08	0.112
	Clean intermittent catheterization	52.78	14.57	48.33	16,58	51,11	14,47	0.235
		0.165		0.082		0.281		
KHQ-Physical Limitations	Transurethral catheterization	41.11	18.43	39.44	18,30	35,00	16,58	<b>0.014</b>
	Suprapubic catheterization	41.94	18.19	42.47	19,17	40,86	18,18	0.871
	Clean intermittent catheterization	41.11	15.62	42.22	18,94	38,89	18,22	0.371
		0.978		0.786		0.425		
KHQ-Social Limitations	Transurethral catheterization	51.85	16.85	54.07	17,92	51,85	18,76	0.432
	Suprapubic catheterization	54.12	17.86	49.46	16,44	56,99	19,40	<b>0.035</b>
	Clean intermittent catheterization	54.81	17.73	56.67	18,99	53,70	19,37	0.911
		0.790		0.282		0.572		
KHQ-Personal relationships	Transurethral catheterization	64.44	18.94	63.33	18,77	66,67	20,53	0.782
	Suprapubic catheterization	65.59	22.33	70.43	21,82	66,67	19,25	0.235
	Clean intermittent catheterization	65.56	21.41	66.11	20,29	68,33	21,15	0.554
		0.971		0.393		0.935		
KHQ-Emotions	Transurethral catheterization	34.81	12.96	32.96	13,52	35,19	13,71	0.399
	Suprapubic catheterization	35.84	13.67	39.43	13,10	31,54	11,86	<b>0.005</b>
	Clean intermittent catheterization	38.15	13.59	33.33	13,05	36,30	13,03	0.235
		0.617		0.105		0.324		
KHQ-Sleep/Energy	Transurethral catheterization	55.56	19.25	50.00	20,06	50,56	17,77	0.771
	Suprapubic catheterization	48.39	15.73	54.84	16,21	45,16	15,03	0.132
	Clean intermittent catheterization	50.00	15.78	49.44	14,17	50,00	15,16	0.788
		0.232		0.396		0.354		
KHQ-Severity Measures	Transurethral catheterization	45.33	10.12	46.44	10,72	42,00	8,95	0.887
	Suprapubic catheterization	49.03	10.41	45.81	10,29	47,96	10,81	0.772
	Clean intermittent catheterization	46.23	10.32	46.30	10,63	44,69	10,35	0.556
		0.162		0.948		0.041		
KGQ-Symptom Severity Scale	Transurethral catheterization	15.20	2.02	15.50	2,047	15,73	1,856	0.988
	Suprapubic catheterization	15.35	1.98	14.77	1,892	15,52	1,913	0.799
	Clean intermittent catheterization	15.27	1.95	15.50	1,907	15,57	1,832	0.881
		0.954		0.248		0.894		

ANOVA test and dependent sample t-test

When the quality of life of the patients was compared, in the within-group evaluation of patients who underwent suprapubic catheterization, the mean KHQ-Emotional status sub-dimension scores at the 6th month were significantly lower compared to the first and third months (1st month=35.84±13.67, 3rd month=39.43±13.10, 6th month=31.54±11.86;  $p=0.005$ ) (Table-3).

The mean KHQ symptom severity sub-dimension scores were significantly lower in patients who underwent transurethral catheterization compared to the patients in the other group at the sixth month (TC=42.00±8.95, SC=47.96±10.81, CIC=44.69±10.35;  $p=0.041$ ) (Table-3).

## DISCUSSION

This study explores how different urinary catheterization practices influence the incidence of urinary complications and their subsequent impact on patients' quality of life. At the end of the study, when the catheterization preferences of patients who needed urinary catheterization due to urinary retention were compared, it was seen that patients who used CIC and suprapubic cystostomy had less UTI and hematuria decreased over time in patients who used CIC. In addition, when their quality of life was compared, it was observed that the social and emotional quality of life of patients who used suprapubic cystostomy improved as the time of use progressed.

The choice of urinary catheterization method—transurethral catheterization (TC), suprapubic cystostomy (SC), or clean intermittent catheterization (CIC)—can significantly impact both urinary complications and the quality of life of patients (12). Each method presents unique advantages and disadvantages, influencing patient outcomes and experiences (13, 14).

Transurethral catheterization, while commonly used, has been associated with a range of complications, including urinary tract infections (UTIs), urgency, incontinence, and hematuria. According to a study, patients who underwent TC reported a higher incidence of UTIs and irritative urinary symptoms when compared to those using other catheterization methods (15). However, a systematic review suggest that while TC may initially present challenges, it may provide better symptom management over time for some patients, indicating a need for individualized assessments for catheter selection (16).

Suprapubic cystostomy has been demonstrated to decrease UTI rates significantly. A study by Krebs et al. (17) reported that patients with SC showed lower UTI rates and fewer complications compared to TC. Nonetheless, despite these benefits, emotional status scores were reported to decline for patients with SC, highlighting the necessity for comprehensive management strategies to address the psychological impact of this procedure (11, 18). This emphasizes the importance of emotional support and education about living with a suprapubic catheter in improving overall patient experience. In our study, it was determined that patients using SC and CIC had fewer UTIs over time. This situation is thought to be related to both the learning of SC catheter care under the supervision of a specialist nurse. In addition, SC is easy to use and, especially, it leads to improvements in quality of life because it is in a position that allows sexual intercourse.

Clean intermittent catheterization has emerged as a favorable option, particularly regarding reducing hematuria and UTI rates (16, 19). A study by Fumincelli et al. found that patients using CIC reported lower complication rates and better quality of life outcomes, especially in emotional and physical health domains (14). As indicated by a systematic review by Kinnear et al., CIC allows for greater autonomy and control over bladder management, which correlates with enhanced patient satisfaction and overall well-being (16). The results of our study showed that patients using CIC experienced fewer complications over time (especially UTI and hematuria). The decrease in complications can be explained by following the correct application steps under the supervision of a specialist nurse and paying attention to hygiene. The use of informational materials such as videos and brochures that aim to review the application steps for CIC use reduces complications related to CIC (4).

The role of nursing in urinary catheter management is critical to optimizing patient outcomes. According to a qualitative study, nurses are vital in educating patients about the different catheterization methods, their associated risks, and the importance of proper catheterization techniques (20). Nursing assessments and interventions play a significant role in monitoring for signs of infection or complications, providing timely interventions, and ensuring emotional support. By fostering a therapeutic relationship, nurses can help patients overcome the challenges of catheterization and

improve their quality of life (21).

Moreover, nursing interventions can significantly influence the quality of life for patients undergoing catheterization. Regular assessments and patient education on hygiene practices can mitigate the psychological burden associated with urinary complications (22). Nurses facilitate communication between patients and healthcare providers, ensuring that concerns are promptly addressed, which can further enhance satisfaction and quality of life.

There are some limitations to the study. The first of these is that the follow-up period was limited to six months. Longer follow-ups are needed to better evaluate the effects of catheterization methods on quality of life. Catheterization preferences were left to the patients' preference and not every patient tried all catheterization methods. Another limitation is that the applied catheter thickness was thicker in the TC group.

## CONCLUSION

In conclusion, the choice of urinary catheterization method profoundly impacts urinary complications and patient quality of life. While TC, SC, and CIC each offer advantages and challenges, CIC appears to provide the best long-term outcomes regarding symptom management and patient autonomy. The nursing role is integral in this context, as effective nursing care has been shown to significantly reduce complications and enhance overall quality of life for patients. Continued research is essential to explore the long-term effects of these catheterization methods and the evolving role of nursing in improving patient outcomes.

**Conflict of Interest:** None.

**Funding:** None.

**Ethics Committee Report:** Istanbul Prof. Dr. Cemil Taşcıoğlu City Hospital was reviewed by the Clinical Research Ethics Committee at its meeting dated 06.11.2023 and found to be ethically appropriate according to decision number 258.

**Authors' Contributions:** Concept – YC; Design – FB; Supervision – FB; Materials – MGC; Data Collection and/or Processing – YC, MGC; Analysis and/or Interpretation –

MGC; Literature Review –YC; Writing –YC, MGC; Critical Review -FB.

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