ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA

DOI: 10.5336/urology.2025-110066

Evaluation of Long-Term Indwelling Transurethral Catheter Use: Retrospective Long-Term Study Results

Uzun Süreli Daimi Transüretral Kateter Kullanımının Değerlendirilmesi: Retrospektif Uzun Dönem Çalışma Sonuçları

Mehmet Sefa ALTAY[a], Fevzi BEDİR[a], Hüseyin KOCATÜRK[a], Emre ŞAM[a], Banu BEDİR[b]

[a]Health Sciences University Erzurum Faculty of Medicine, Department of Urology, Erzurum, Türkiye
[b]Erzurum Provincial Health Directorate, Erzurum, Türkiye

ABSTRACT Objective: This study aims to assess complications arising from long-term transurethral (TU) catheter use due to various medical conditions and evaluate management strategies for these patients. **Material and Methods:** A retrospective analysis was conducted on patients with indwelling TU catheters between March 2020-December 2024. Patients unable to visit the urology outpatient clinic were managed through home care services and telemedicine consultations. TU catheters were replaced biweekly in cases of urinary tract infections and catheter encrustation, and every 4 weeks in patients without complications. Demographic data, catheter use indications, duration, lower urinary tract symptoms, and complications were assessed. **Results:** A total of 169 patients were included, with 60.9% (n=103) male and 39.1% (n=66) female. The mean patient age was 70.25±23.18 years, with females averaging 75.89±13.02 years and males 66.64±12.33 years. Among male patients, 82.5% (n=85) required TU catheterization due to benign prostatic hyperplasia. Neurological conditions accounted for 41.4% (n=70) of catheter use (alzheimer: 10.7%, dementia: 13.6%, amyotrophic lateral sclerosis: 1.8%, hemiplegia: 11.8%, multiple sclerosis: 1.8%), while 4.7% (n=14) required catheterization due to hygiene concerns or limited physical effort capacity. Complications included asymptomatic bacteriuria (24.3%, n=41), bacterial growth in urine cultures (38.5%, n=65), urethral necrosis (6.5%, n=11), and catheter encrustation (5.3%, n=9). Additionally, 5.3% (n=9) had a history of coronavirus disease-2019 infection. **Conclusion:** The management of patients with long-term TU catheters is essential for preventing complications and optimizing patient outcomes. Regular monitoring and a multidisciplinary approach are critical in ensuring effective care.

Keywords: Catheters; catheter-related infections; foster home care; health services for the aged; urethra

ÖZET Amaç: Bu çalışmanın amacı, çeşitli tıbbi durumlar nedeniyle uzun süreli transüretral [transurethral (TU)] kateter kullanımından kaynaklanan komplikasyonları değerlendirmek ve bu hastalar için yönetim stratejilerini değerlendirmektir. **Gereç ve Yöntemler:** Mart 2020-Aralık 2024 tarihleri arasında daimi TU kateter takılı hastalar retrospektif olarak değerlendirildi. Üroloji polikliniğine başvuramayan hastalar, evde bakım hizmetleri ve ürolojik konsültasyonlarla tedavi altına alındı. İdrar yolu enfeksiyonu ve kateter enkrustasyonu durumlarında TU kateteri her 2 haftada 1, normal durumda olanlarda ise 4 haftada 1 değiştirildi. Demografik veriler, kateter kullanım endikasyonları, süre, alt üriner sistem semptomları ve komplikasyonlar değerlendirilmiştir. **Bulgular:** Toplamda 169 hasta çalışmaya dâhil edildi. Hastaların %60,9'u (n=103) erkek, %39,1'i (n=66) kadındı. Hastaların yaş ortalaması 70,25±23,18 yıl olup, kadınların yaş ortalaması 75,89±13,02 yıl, erkeklerin yaş ortalaması ise 66,64±12,33 yıl idi. Erkek hastaların %82,5'i (n=85) benign prostat hiperplazisi nedeniyle TU kateteriyle takip edilmekteydi. Hastaların %41,4'ü (n=70) nörolojik sebeplerle (alzheimer: %10,7, demans %13,6, amyotrofik lateral skleroz %1,8, hemipleji %11,8, multiple skleroz %1,8) ve geri kalan %4,7'si (n=14) hijyenik sorunlar ve düşük efor kapasitesi nedeniyle sürekli TU kateteriyle izlenmekteydi. Hastaların %24,3'ü (n=41) asemptomatik bakteriüri, %38,5'i (n=65) idrar kültüründe üreme, %6,5'i (n=11) üretral nekroz, %5,3'ü (n=9) ise TU kateterinin taşlaşması tespit edildi. Ayrıca, %5,3'ü (n=9) koronavirüs hastalığı-19 geçirmişti. **Sonuç:** Uzun süreli TU kateterleri olan hastaların yönetimi, komplikasyonları önlemek ve hasta sonuçlarını optimize etmek için önemlidir. Düzenli izleme ve multidisipliner bir yaklaşım, etkili bakımı sağlamada kritik öneme sahiptir.

Anahtar Kelimeler: Kateter; kateterle ilgili enfeksiyonlar; yaşlı bakım evi; yaşlılar için sağlık hizmetleri; üretra

Correspondence: Mehmet Sefa ALTAY
Health Sciences University Erzurum Faculty of Medicine, Department of Urology, Erzurum, Türkiye
E-mail: memsefaaltay@gmail.com

Peer review under responsibility of Journal of Reconstructive Urology.

Received: 28 Feb 2025 ***Received in revised form:*** 15 Mar 2025 ***Accepted:*** 20 Mar 2025 ***Available online:*** 27 Mar 2025

The use of transurethral (TU) catheters in urological practice holds a significant place in both treatment and as a means of gaining time until surgery, particularly in cases of various obstructive and non-obstructive conditions.[1] Benign prostatic hyperplasia (BPH) is the most common cause; however, urethral stones, urethral strictures, urothelial tumors, and prolapse of pelvic and abdominal organs can exert pressure on the bladder neck, leading to urinary retention.[2] Additionally, infectious conditions-including cystitis, urethritis, prostatitis, and vulvovaginitis-along with certain medications such as anticholinergics and alpha-adrenergic agonists, can contribute to urinary retention. Neurological disorders, including spinal cord injuries, cerebrovascular accidents, multiple sclerosis, Parkinson's disease, and dementia, as well as trauma, psychogenic factors, and Fowler's syndrome in women, are also recognized contributors to this condition.[2-5]

With the emergence of coronavirus disease-2019 (COVID-19) in November 2019, patients who developed urinary retention and could not undergo surgical treatment were managed with TU catheters.[6] These patients were treated by inserting either suprapubic or TU catheters.[7] Since surgical interventions could potentially exacerbate the progression of COVID-19, the treatment of these patients was postponed for an extended period, and they were monitored with TU catheters.[8]

TU catheterization is associated with complications such as urinary tract infections (UTIs), urethritis, urethral trauma, and bladder mucosal irritation.[9] Long-term catheterization increases the risk of UTIs, making catheter avoidance crucial for infection prevention.[10] Long-term catheterization is defined as catheter use exceeding one month.[11] Indwelling TU catheters should be replaced every 2-4 weeks.

Each year, approximately 5 million patients receive treatment with TU catheters, with an estimated prevalence of 4% in home care patients and 25% in hospitalized patients.[12] It is known that 70-80% of UTIs are catheter-associated.[12,13] Urinary catheters account for approximately 40% of all hospital-acquired UTIs, leading to prolonged hospital stays, increased healthcare costs, and higher mortality rates.[14,15]

This study aims to evaluate the complications that arise in patients with long-term TU catheters due to various medical conditions and to assess the management of these patients.

MATERIAL AND METHODS

This study complies with the principles of the Declaration of Helsinki and following the approval of the Republic of Türkiye Ministry of Health (2020-11-26T12_43_44) and regional institutional Clinical Research Ethics Committee ethical approval (date: December 21, 2020; no: 2020/23-216), patients with indwelling TU catheters who were monitored between March 2020-December 2024 were retrospectively evaluated.

In Türkiye, most elderly and dependent individuals receive care at home by their relatives, thereby reducing the burden on nursing homes. Government institutions provide social support to these individuals and their families, while medical care is administered through "home healthcare services" by professional teams, with specialist consultations as needed. A home healthcare team typically consists of a physician, a nurse, and a healthcare professional.

Patients with urinary retention due to various reasons who presented to the hospital had their TU catheters replaced, and catheter care was provided. For patients unable to visit the hospital, treatment was administered at regular intervals by the "home healthcare services" team, and urology consultations were obtained when necessary. These patients were monitored every 4 weeks via telephone or video conference. Early contact was established with patients who developed complications or experienced lower urinary tract symptoms. TU catheters of patients UTIs were replaced every 2 weeks. These patients underwent routine urinalysis, urine culture, renal function tests, biochemical tests, and acute phase reactant evaluations, and their treatments were adjusted accordingly. TU catheters that developed encrustation, became obstructed, or were difficult to insert were also replaced every 2 weeks. In the absence of complications, TU catheters were routinely changed every 4 weeks. Psychiatric and other clinical consultations were requested when necessary.

Patients whose surgical procedures were postponed during the COVID-19 pandemic underwent surgery after the pandemic. Those who remained with TU catheters during this period were included in the study.

INCLUSION AND EXCLUSION CRITERIA

Patients over 18 years of age with indwelling TU catheters, regardless of sex, were included in the study. Patients with whom regular communication and follow-up could not be maintained were excluded from the study.

The patients' age, sex, indications for TU catheterization, duration of TU catheter use, lower urinary tract symptoms (LUTS), complications, and treatment modalities were evaluated.

STATISTICAL ANALYSIS

Data entry and analysis were performed using the SPSS v20 for Windows. Categorical variables were expressed as frequencies and percentages, while numerical variables were presented as means and standard deviations. The suitability of numerical variables for analysis was assessed using the Kolmogorov-Smirnov test. For hypothesis testing, the Wilcoxon test was used to compare numerical variables. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 169 patients were included in the study. Of these, 60.9% (n=103) were male, and 39.1% (n=66) were female. The mean age of all patients was 70.25±23.18 years, with females having a significantly higher mean age (75.89±13.02 years) compared to males (66.64±12.33 years) ($p<0.001$).

Due to the advanced age of the patients, most had chronic comorbidities. The distribution of certain chronic diseases by sex is summarized in Table 1.

The mean duration of TU catheter use among the patients was 16.78±8.18 months. Among the male patients, 82.5% (n=85) required TU catheterization due to BPH. In this group, 8.9% (n=15) had TU catheterization specifically for the management of acute renal failure. Additionally, 41.4% (n=70) of all patients required TU catheterization for neurological conditions, including Alzheimer's disease (10.7%), dementia (13.6%), amyotrophic lateral sclerosis (1.8%), hemiplegia (11.8%), and multiple sclerosis (1.8%). The remaining 4.7% (n=14) were catheterized due to hygiene-related issues and reduced physical capacity.

TABLE 1: Chronic diseases and complications observed in patients included in the study

	Female (n, %)	Male (n, %)	Total (n, %)
Disease			
DM	30 (45.5%)	36 (35.0%)	66 (39.1%)
Hypertension	45 (68.2%)	52 (50.5%)	97 (57.4%)
CVE	17 (25.8%)	6 (5.8%)	23 (13.6%)
COPD	22 (33.3%)	59 (57.3%)	81 (47.9%)
Aortic Aneurysm	-	5 (4.9%)	5 (3.0%)
PE	4 (6.1%)	7 (6.8%)	11 (6.5%)
CAD	8 (12.1%)	26 (25.2%)	34 (20.1%)
Asthma	3 (4.5%)	3 (2.9%)	6 (3.6%)
RA	2 (3.0%)	1 (1.5%)	3 (1.8%)
BPH	-	85 (82.5%)	85 (50.3%)
Alzheimer's disease	11 (16.7%)	7 (6.8%)	18 (10.7%)
Dementia	17 (25.8%)	6 (5.8%)	23 (13.6%)
Metastatic brain tumor	2 (3.0%)	1 (1.0%)	3 (1.8%)
ALS	-	3 (2.9%)	3 (1.8%)
Hemiplegia	14 (21.2%)	3 (2.9%)	17 (10.0%)
Malignant melanoma	2 (3.0%)	1 (1.0%)	3 (1.8%)
Ca	-	2 (1.9%)	2 (1.2%)
ARF	-	15 (14.6%)	15 (8.9%)
MS	1 (1.5%)	2 (1.9%)	3 (1.8%)
Complication			
Asymptomatic bacteriuria	24 (36.4%)	17 (16.5%)	41 (24.3%)
Urine culture growth	29 (43.9%)	36 (35.0%)	65 (38.5%)
Urethral necrosis	5 (7.6%)	6 (5.8%)	11 (6.5%)
Encrustation of TU Catheter	2 (3.0%)	7 (6.8%)	9 (5.3%)

DM: Diabetes mellitus; CVE: Cerebrovascular event; COPD: Chronic obstructive pulmonary disease; PE: Pulmonary embolism; CAD: Coronary artery disease; RA: Rheumatoid arthritis; BPH: Benign prostatic hyperplasi; ALS: Amyotrophic lateral sclerosis; Ca: Lung cancer; ARF: Acute renal failure; MS: Multiple sclerosis; TU: Transurethral

Among patients with BPH, 67% (n=57) reported discomfort with the catheter and expressed a desire for surgery, whereas 33% (n=28) declined surgical intervention due to concerns about surgical complications. Patients with permanent TU catheterization for non-BPH reasons appeared to tolerate the catheter more effectively.

After the COVID-19 pandemic, patients visited the hospital at an average interval of 4.15±3.94

months. However, during the pandemic, no outpatient clinic visits were recorded, and patient follow-ups were conducted exclusively by home healthcare services. After the pandemic, home healthcare services were found to be more effective and provided longer-term care. A statistically significant difference was observed between pre-pandemic and pandemic-period healthcare visit intervals ($Z=7.726$, $p<0.001$).

Among patients with indwelling TU catheters, 24.3% (n=41) had asymptomatic bacteriuria, while 38.5% (n=65) had bacterial growth detected in their urine cultures. These complications, stratified by sex, are summarized in Table 1. Additionally, 6.5% (n=11) of patients developed urethral necrosis, and 5.3% (n=9) had encrusted TU catheters (Table 1).

Patients with asymptomatic bacteriuria were monitored without antibiotic intervention, whereas those with bacterial growth exceeding 100,000 colony-forming units in urine culture with TU catheter complications were treated with appropriate antibiotic therapy according to susceptibility testing, and their TU catheters were replaced. Patients who developed urethral necrosis were managed with debridement, wound care, and suprapubic transvesical catheter placement. Encrusted TU catheters were removed using appropriate interventional procedures, followed by catheter replacement every 2 weeks.

Furthermore, 5.3% (n=9) of the patients receiving home TU catheter care were diagnosed with COVID-19 during the study period.

DISCUSSION

In urological practice, TU catheters are frequently used, primarily for urinary retention, among other indications.[1,2] During the study period, particularly in the COVID-19 era, it was recommended to postpone surgery for urinary retention due to BPH and manage patients with either TU or self-catheterization.[6,16] In our study, 82.5% of male patients developed acute urinary retention due to BPH and were monitored with TU catheters. The remaining patients required TU catheterization mainly due to chronic illnesses. All female patients were also catheterized due to chronic diseases. However, in cases of obstructive uropathy, recurrent hematuria, or renal failure, appropriate interventions should be considered. TU catheter encrustation, difficulty in catheter replacement, and frequent UTIs warrant catheter replacement every 2-4 weeks.[17] Our patients received appropriate interventions in line with these recommendations. If none of the aforementioned pathologies were present, TU catheter replacement was performed every four weeks.

Risk factors associated with prolonged TU catheterization include male sex, advanced age, cancer, cardiovascular disease, chronic pulmonary disease, hypertension, and diabetes mellitus.[11] As summarized in Table 1, most patients in our study had chronic illnesses, which posed challenges in ensuring routine outpatient follow-up and necessary interventions.

During the COVID-19 pandemic, it was reported that 37.6% of elective urological surgeries were completely halted, while 75% experienced a significant reduction.[18] The first COVID-19 case in Türkiye was reported on March 11, 2020, prompting an intensification of previously implemented precautionary measures nationwide.[19] Our hospital was designated a pandemic hospital in March, April, and May 2020, leading to the postponement of all elective cases. In June-July 2020, elective surgeries resumed under controlled conditions. However, with the resurgence of COVID-19 cases on August 15, 2020, the hospital was once again designated a pandemic hospital, resulting in the continued postponement of elective surgical procedures. Consequently, some patients in our study remained under long-term TU catheterization due to the unavailability of surgical interventions. In our study, patients who had to be monitored with TU catheters during this period were included. Patients whose surgical procedures were postponed during the COVID-19 pandemic underwent surgery after the pandemic.

It is well established that, during the COVID-19 period, elective surgeries were frequently postponed, and hospital visits for non-COVID symptoms significantly decreased.[20] Our study found that, during this period, frequent consultations were conducted via telephone, video conference, and home healthcare services to manage urological pathologies.

For patients with permanent TU catheterization who develop UTIs, catheter replacement every 2 weeks is recommended.[21] In our study, 38.5% of patients developed LUTS with positive urine cultures, necessitating targeted antibiotic therapy and TU catheter replacement every 2 weeks as part of the treatment.

Urethral catheterization can lead to complications ranging from hematuria, urethrorrhagia, and urethral trauma to urethral strictures, pseudopolyps, cystitis, pyelonephritis, and sepsis.[22] In our study, 6.5% of patients developed urethral necrosis, and 5.3% had encrusted TU catheters, for which appropriate treatments were administered.

For patients with asymptomatic bacteriuria (≥100,000 CFU/mL of uropathogens), antibiotic therapy is not indicated except in pregnant women or those undergoing urological endoscopic procedures associated with mucosal trauma, to prevent antibiotic resistance.[23] In our study, asymptomatic bacteriuria was detected in 24.3% of patients and patients with asymptomatic bacteriuria were monitored without antibiotic intervention.

In prolonged pandemics such as COVID-19, patients were monitored with long-term TU catheters due to the postponement of surgical procedures. After the pandemic ended, those eligible for surgery underwent the necessary procedures. We believe that our study will contribute to the literature regarding the treatment and management of patients with long-term TU catheters, both in routine conditions and during extraordinary periods like pandemics.

CONCLUSION

The management of patients with TU catheters is crucial and requires regular follow-up. It is particularly important for nurses, medical technicians, and non-specialist physicians providing home healthcare services to maintain continuous communication with urologists. Potential complications in patients receiving home TU catheterization can be minimized through close collaboration between urologists and other healthcare professionals. Early intervention can help prevent complications and improve patient outcomes.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mehmet Sefa Altay, Fevzi Bedir;* ***Design:*** *Mehmet Sefa Altay, Fevzi Bedir, Hüseyin Kocatürk, Emre Şam;* ***Control/Supervision:*** *Mehmet Sefa Altay, Emre Şam, Fevzi Bedir;* ***Data Collection and/or Processing:*** *Banu Bedir, Fevzi Bedir;* ***Analysis and/or Interpretation:*** *Mehmet Sefa Altay, Fevzi Bedir, Hüseyin Kocatürk, Emre Şam;* ***Literature Review:*** *Mehmet Sefa Altay, Fevzi Bedir, Hüseyin Kocatürk, Emre Şam;* ***Writing the Article:*** *Mehmet Sefa Altay, Fevzi Bedir, Hüseyin Kocatürk, Emre Şam;* ***Critical Review:*** *Fevzi Bedir, Mehmet Sefa Altay, Hüseyin Kocatürk;* ***Materials:*** *Banu Bedir, Hüseyin Kocatürk, Emre Şam.*

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