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Original Research Article

Routine Cystoscopic Ureteral Stent Removal with or without Antibiotic Prophylaxis

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Abstract:

Background: Routine cystoscopic ureteral stent removal is commonly performed after uncomplicated urological procedures. However, the necessity of antibiotic prophylaxis during stent removal remains controversial, particularly in low-risk patients, because unnecessary antibiotic exposure may contribute to antimicrobial resistance and adverse effects.

Aim: To evaluate whether routine antibiotic prophylaxis was necessary for preventing post-procedural urinary tract infection (UTI) following uncomplicated cystoscopic ureteral stent removal.

Materials and Methods: This prospective comparative clinical study included 100 adult patients undergoing routine outpatient cystoscopic ureteral stent removal following uncomplicated urological procedures, predominantly ureteroscopy and treatment of urinary calculi. Patients were divided into two equal groups: Group A (n=50) received antibiotic prophylaxis, while Group B (n=50) underwent stent removal without antibiotic prophylaxis. Patients with active UTI, significant immunosuppression, renal transplantation, urinary diversion, long-term stenting, or complex urological conditions were excluded. Baseline clinical characteristics, pre-procedural urine findings, post-procedural urinary symptoms, and infectious complications were assessed. Patients were followed for 30 days after stent removal.

Results: The mean age of the study population was 46.2 ± 13.0 years, and 62% were male. The two groups were comparable regarding demographic characteristics, diabetes mellitus, previous UTI, indication for stenting, preceding urological procedure, and duration of stent indwelling (P>0.05). Ureteric calculi were the most common indication for stent placement (69%), and ureteroscopy was the most frequent preceding procedure (73%). Post-procedural urinary symptoms were comparable between the groups. Symptomatic UTI occurred in 2 patients (4%) in the antibiotic group and 1 patient (2%) in the no-antibiotic group (P=0.56). Culture-confirmed UTI showed a similar distribution, with 2 cases (4%) in the antibiotic group and 1 case (2%) in the no-antibiotic group (P=0.56). No patient developed febrile UTI, pyelonephritis, urosepsis, or required hospital admission. *Escherichia coli* was the most frequently isolated organism (66.7%), followed by *Klebsiella pneumoniae* (33.3%).

Conclusion: Routine antibiotic prophylaxis did not significantly reduce the incidence of symptomatic or culture-confirmed UTI following uncomplicated cystoscopic ureteral stent removal in this low-risk study population. An antibiotic-sparing approach may therefore be appropriate for carefully selected patients without active urinary infection or major risk factors. However, larger multicentre prospective studies are required to establish definitive risk-based recommendations for antibiotic prophylaxis.

Keywords: Cystoscopy; Ureteral Stent; Stent Removal; Antibiotic Prophylaxis; Urinary Tract Infection; Antimicrobial Stewardship.

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Introduction

Healthcare-associated infections remain a significant concern in contemporary medical practice and represent an important threat to patient safety. In the field of urology, infections occurring in the aftermath of diagnostic or therapeutic procedures can lead to considerable morbidity, increased mortality, prolonged hospitalization, and additional healthcare expenditure. At the same

time, the inappropriate and excessive use of antimicrobial agents has accelerated the emergence and spread of drug-resistant bacterial strains, creating an increasingly serious challenge for effective infection management and antimicrobial stewardship.

Ureteral stent placement is a commonly performed intervention in modern urological practice, particularly following ureteroscopy, treatment of urinary calculi, relief of ureteral obstruction, and other endourological procedures. Although ureteral stents are generally intended for temporary use, their subsequent removal represents an essential part of patient management. In patients with an uncomplicated postoperative course, ureteral stents are frequently removed as an outpatient procedure using flexible or rigid cystoscopy. Cystoscopic ureteral stent removal is considered a minimally invasive procedure; however, instrumentation of the urinary tract may theoretically increase the risk of bacterial inoculation and subsequent urinary tract infection (UTI). Consequently, antibiotic prophylaxis has traditionally been used by many urologists during cystoscopic stent removal, despite concerns regarding unnecessary antibiotic exposure and antimicrobial resistance. [1]

The necessity of antibiotic prophylaxis specifically for routine cystoscopic ureteral stent removal remains controversial. The evidence supporting prophylaxis has historically been extrapolated from recommendations for other urological procedures involving urinary tract manipulation, while direct evidence regarding stent removal has been comparatively limited. [2]

This distinction is clinically important because routine antibiotic administration in patients at low risk of infection may expose them to adverse drug reactions, increase healthcare costs, and contribute to antimicrobial resistance without providing a measurable clinical benefit. Therefore, determining whether antibiotics can be safely omitted in selected patients is an important component of antimicrobial stewardship in urological practice. [3]

Despite these findings, uncertainty persists regarding the optimal use of antibiotic prophylaxis during routine cystoscopic ureteral stent removal. Variations in patient characteristics, stent duration, previous urological procedures, baseline urine culture, and local antimicrobial resistance patterns may influence infectious outcomes. Therefore, the present prospective comparative study was undertaken to compare the incidence of post-procedural UTI among patients undergoing routine cystoscopic ureteral stent removal with and without antibiotic prophylaxis, with the aim of evaluating whether routine antibiotic administration provides a clinically meaningful preventive benefit in appropriately selected patients.

Aim of the study: To evaluate whether routine antibiotic prophylaxis is necessary for the prevention of post-procedural urinary tract infection in patients undergoing uncomplicated cystoscopic ureteral stent removal.

Objectives of the study: To compare the incidence of symptomatic urinary tract infection following routine cystoscopic ureteral stent removal in patients receiving antibiotic prophylaxis and those undergoing stent removal without antibiotic prophylaxis.

Methodology

Study design: Prospective comparative clinical study

Study setting: The study was designed as a prospective comparative clinical study conducted in the Department of Urology at Akash Institute of Medical Sciences and Research Centre, Karnataka, India.

Study population: The study included 100 adult patients scheduled for routine outpatient cystoscopic removal of a ureteral stent following an uncomplicated urological procedure, predominantly ureteroscopy or treatment of urinary calculi. Patients were further divided into two groups; Group A: 50 patients receiving antibiotic prophylaxis and Group B: 50 patients undergoing cystoscopic stent removal without antibiotic prophylaxis.

Inclusion criteria: The study included adult patients aged ≥18 years who were scheduled for routine cystoscopic ureteral stent removal following an uncomplicated urological procedure, particularly ureteroscopy or endourological treatment of urinary calculi. Patients who were clinically stable, willing to participate in the study, and provided written informed consent were included. Patients with no clinical evidence of active urinary tract infection (UTI) at the time of stent removal and those who were able to comply with the prescribed follow-up schedule were also included.

Exclusion criteria: Patients were excluded if they had active or symptomatic UTI, a positive urine culture requiring antimicrobial treatment at the time of stent removal, fever or signs of systemic infection, recent urosepsis, immunosuppression, pregnancy, renal transplantation, urinary diversion, long-term indwelling ureteral stents, concurrent urinary catheterisation, or significant structural abnormalities of the urinary tract. Patients undergoing stent removal following complex reconstructive or oncological urological procedures, those who had received therapeutic antibiotics immediately before the planned stent removal, patients unable to provide informed

consent, and those unlikely to complete the required follow-up period were also excluded.

Pre-procedure Assessment: Prior to cystoscopic ureteral stent removal, all patients underwent a detailed clinical evaluation. A comprehensive medical history and physical examination were performed, with particular attention to any previous history of urinary tract infection (UTI), diabetes mellitus, and other relevant comorbidities. The indication for ureteral stent placement, the type of preceding urological procedure, and the duration of stent indwelling was documented for each patient. Routine laboratory assessment included urinalysis, while urine culture was performed when clinically indicated or as per the study protocol. Patients who demonstrated clinical or microbiological evidence of active urinary tract infection at the time of assessment were managed appropriately with antimicrobial therapy and were excluded from the comparative analysis.

Follow-up: All patients were followed prospectively for 30 days following cystoscopic ureteral stent removal. Follow-up assessments were conducted at predetermined intervals, and patients were advised to report promptly if they developed any symptoms suggestive of urinary tract infection or other post-procedural complications. These symptoms included fever, dysuria, increased urinary frequency, urinary urgency, suprapubic discomfort, flank pain, haematuria, chills, or rigors. Patients presenting with clinical features suggestive of UTI underwent appropriate laboratory evaluation, including urine culture, to confirm the diagnosis and guide subsequent antimicrobial treatment.

Statistical Analysis: The collected data were entered into a computerised database and analysed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on the distribution of the data, while categorical variables were presented as frequencies and percentages. The incidence of urinary tract infection (UTI) between the two study groups was compared using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the student's t-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data. Multivariable logistic regression analysis was performed, where appropriate, to identify independent predictors of post-procedural UTI, including age, sex, diabetes mellitus, history of previous UTI, duration of ureteral stenting, type of preceding urological procedure, and pre-procedural urine findings. A P-value of <0.05 was considered statistically significant.

Result and Observations

Table 1: Demographic and baseline clinical characteristics of the study participants

Variables	Antibiotic group (n=50)	No-antibiotic group (n=50)	Total (n=100)	P-value
Age (years), mean ± SD	46.8 ± 13.2	45.6 ± 12.9	46.2 ± 13.0	0.65
Age group (years)				
18–30	7 (14.0%)	8 (16.0%)	15 (15.0%)	0.92
31–45	16 (32.0%)	17 (34.0%)	33 (33.0%)	
46–60	19 (38.0%)	17 (34.0%)	36 (36.0%)	
>60	8 (16.0%)	8 (16.0%)	16 (16.0%)	
Sex				
Male	32 (64.0%)	30 (60.0%)	62 (62.0%)	0.68
Female	18 (36.0%)	20 (40.0%)	38 (38.0%)	
Diabetes mellitus	7 (14.0%)	6 (12.0%)	13 (13.0%)	0.77
Previous history of UTI	8 (16.0%)	7 (14.0%)	15 (15.0%)	0.78

UTI: urinary tract infection; SD: standard deviation.

Table 2: Indication for ureteral stent placement and preceding urological procedure

Variables	Antibiotic group (n=50)	No-antibiotic group (n=50)	Total (n=100)	P-value
Indication for stent placement				
Ureteric calculus	34 (68.0%)	35 (70.0%)	69 (69.0%)	0.82
Renal calculus	12 (24.0%)	11 (22.0%)	23 (23.0%)	-
Ureteric obstruction	4 (8.0%)	4 (8.0%)	8 (8.0%)	-
Preceding procedure				
Ureteroscopy	36 (72.0%)	37 (74.0%)	73 (73.0%)	0.81
RIRS	10 (20.0%)	9 (18.0%)	19 (19.0%)	-
Other endourological procedure	4 (8.0%)	4 (8.0%)	8 (8.0%)	-
Mean stent duration (days)	18.4 ± 6.1	17.9 ± 5.8	18.2 ± 5.9	0.68

RIRS: Retrograde intrarenal surgery

Table 3: Pre-procedural urine findings

Urine findings	Antibiotic group (n=50)	No-antibiotic group (n=50)	Total (n=100)	P-value
Normal urinalysis	38 (76.0%)	39 (78.0%)	77 (77.0%)	0.81
Microscopic haematuria	8 (16.0%)	7 (14.0%)	15 (15.0%)	0.78
Pyuria without symptomatic UTI	4 (8.0%)	4 (8.0%)	8 (8.0%)	1.00
Positive urine culture	0	0	0	-

Table 4: Comparison of post-procedural urinary symptoms

Symptoms	Antibiotic group (n=50)	No-antibiotic group (n=50)	P-value
Dysuria	5 (10.0%)	4 (8.0%)	0.73
Increased urinary frequency	6 (12.0%)	5 (10.0%)	0.75
Urinary urgency	4 (8.0%)	4 (8.0%)	1.00
Suprapubic discomfort	3 (6.0%)	3 (6.0%)	1.00
Flank pain	4 (8.0%)	3 (6.0%)	0.69
Haematuria	7 (14.0%)	6 (12.0%)	0.76
Fever	1 (2.0%)	1 (2.0%)	1.00
Chills/rigors	0	0	-

Table 5: Comparison of post-procedural infectious outcomes

Outcome	Antibiotic group (n=50)	No-antibiotic group (n=50)	P-value
Symptomatic UTI	2 (4.0%)	1 (2.0%)	0.56
Culture-confirmed UTI	2 (4.0%)	1 (2.0%)	0.56
Febrile UTI	0	0	-
Pyelonephritis	0	0	-
Urosepsis	0	0	-
Emergency department visit	1 (2.0%)	1 (2.0%)	1.00
Hospital admission	0	0	-
Therapeutic antibiotics required	2 (4.0%)	1 (2.0%)	0.56

Table 6: Microbiological profile of patients with culture-confirmed UTI

Microorganism	Antibiotic group (n=2)	No-antibiotic group (n=1)	Total
Escherichia coli	1 (50.0%)	1 (100%)	2 (66.7%)
Klebsiella pneumoniae	1 (50.0%)	0	1 (33.3%)
Total	**2**	**1**	**3**

The mean age of the study participants was 46.2 ± 13.0 years, and males constituted most of the study population. The two groups were comparable regarding age, sex, diabetes mellitus, and previous history of UTI, with no statistically significant differences observed between them (P>0.05). [Table 1]

Ureteric calculi were the most common indication for stent placement, while ureteroscopy was the most frequently performed preceding procedure. The mean duration of stent indwelling was similar in both groups, with no statistically significant difference between them (P>0.05). [Table 2]

Most patients had normal urinalysis findings before stent removal. Microscopic haematuria and pyuria without symptomatic UTI were observed in a small proportion of patients. No significant difference was found between the two groups, and none had a positive urine culture requiring treatment. [Table 3]

The occurrence of post-procedural urinary symptoms, including dysuria, frequency, urgency, suprapubic discomfort, flank pain, and haematuria, was low and comparable between the two groups. No statistically significant differences were observed. [Table 4]

Symptomatic and culture-confirmed UTI occurred infrequently in both groups. The incidence of UTI was slightly higher in the antibiotic group than in the no-antibiotic group, but the difference was not statistically significant. No patient developed febrile UTI, pyelonephritis, urosepsis, or required hospital admission. [Table 5]

Among the patients who developed culture-confirmed UTI, Escherichia coli was the most frequently isolated organism, followed by Klebsiella pneumoniae. The number of culture-positive cases was small in both groups. [Table 6]

Discussion

The present prospective comparative study evaluated 100 patients undergoing routine cystoscopic ureteral stent removal, with 50 patients receiving antibiotic prophylaxis and 50 undergoing stent removal without prophylaxis. The two groups were comparable with respect to age, sex, diabetes mellitus, previous urinary tract infection (UTI), indication for stent placement, preceding urological procedure, and duration of stenting. Most patients had undergone ureteroscopy or other endourological procedures for urinary calculi. This clinical profile was comparable with previous studies of routine stent removal following stone surgery, particularly those conducted by Abbott et al. and Bradshaw et al. [1,3]

In the present study, the mean age was 46.2 ± 13.0 years and males constituted the majority of participants. Diabetes mellitus and previous UTI were present in only a small proportion of patients. The comparable baseline characteristics between the two groups reduced the possibility that differences in infection rates were attributable to major demographic or clinical imbalances. Similar low-risk populations were investigated by Abbott et al. and Bradshaw et al., who specifically evaluated patients undergoing cystoscopic stent removal after stone-related procedures. In contrast, studies involving kidney transplant recipients represented a substantially higher-risk population because of immunosuppression and the complexity of the underlying urinary tract reconstruction. [3-4]

The pre-procedural urinary findings in the present study demonstrated that most patients had no significant urinary abnormality, and patients with active infection were excluded from the comparative analysis. This selection criterion was important because pre-existing bacteriuria appears to be an important determinant of infection following stent removal. Olivero et al., in a prospective observational study of 192 patients undergoing flexible cystoscopic stent removal without antimicrobial prophylaxis, reported febrile UTI in 10.9% of patients and identified pre-procedural bacteriuria and higher BMI as significant risk factors. Their findings suggested that antibiotic prophylaxis might be more appropriately targeted toward high-risk individuals rather than routinely administered to all patients. The lower infection rate in the present study may, therefore, have been partly related to the exclusion of patients with active infection or clinically significant bacteriuria. [5]

The post-procedural urinary symptoms observed in the present study, including dysuria, frequency, urgency, suprapubic discomfort, flank pain, and haematuria, were comparable between the antibiotic and no-antibiotic groups. These symptoms may occur as a consequence of cystoscopic instrumentation and transient urinary tract irritation and should not necessarily be considered equivalent to microbiologically confirmed UTI. The randomized controlled trial by Bradshaw et al. similarly demonstrated a very low rate of infectious complications, with no symptomatic culture-confirmed UTI occurring in either the antibiotic or control group. These findings supported the view that routine antibiotic administration did not substantially modify the short-term symptom profile following uncomplicated cystoscopic stent removal. [1,6]

The principal finding of the present study was that symptomatic UTI occurred in 4% of patients receiving antibiotic prophylaxis compared with 2% of patients who did not receive antibiotics. Although the numerical incidence was slightly higher in the antibiotic group, the difference was not statistically significant. This finding was consistent with the randomized controlled study of Bradshaw et al., which found no symptomatic culture-confirmed UTI in either treatment group. It was also broadly consistent with the retrospective study of Abbott et al., in which symptomatic UTI occurred in 6% of patients receiving prophylaxis compared with none of those who did not receive antibiotics. Collectively, these findings suggested that routine antibiotic prophylaxis did not provide a clear preventive advantage in low-risk patients undergoing uncomplicated cystoscopic stent removal. [3,7]

However, the results of the present study differed from those reported by Olivero et al. Their prospective study found a 10.9% rate of febrile UTI following stent removal without prophylaxis, particularly among patients with asymptomatic bacteriuria, higher BMI, and older age. This apparent discrepancy was clinically important and may have reflected differences in patient selection, baseline bacteriuria, outcome definitions, and follow-up methodology. The present study excluded patients with active infection and focused primarily on uncomplicated stent removal, whereas the Olivero study emphasized that even asymptomatic bacteriuria could identify a subgroup at increased risk. Therefore, the present findings supported selective omission of prophylaxis in low-risk patients, rather than complete abandonment of antibiotic prophylaxis in every patient undergoing stent removal. [5]

Evidence from kidney transplantation further emphasized the importance of patient-specific risk stratification. Lee et al. evaluated 277 kidney transplant recipients and found no significant reduction in UTI with additional antibiotic prophylaxis at stent removal. However, their overall UTI rates were substantially higher than those expected in uncomplicated stone-related

cases. More recent prospective evidence from kidney transplant recipients has suggested that a urine culture-guided antibiotic strategy may reduce post-procedural UTI, while early bedside stent removal has also been investigated as a strategy to reduce infectious complications. These studies indicated that high-risk transplant recipients should not necessarily be managed according to the same antibiotic policy as otherwise healthy patients undergoing routine stent removal after ureteroscopy. [4,8]

A similar distinction was observed in patients undergoing radical cystectomy with intestinal urinary diversion. The recent study by Kitano et al. evaluated 128 patients and found that febrile pyelonephritis occurred in 3% of patients receiving culture-guided prophylaxis compared with 16% receiving empirical prophylaxis. Culture-guided prophylaxis was independently associated with a lower risk of febrile pyelonephritis. These results contrasted with the present low-risk population but provided important evidence that antibiotic strategy may remain beneficial in patients with reconstructed urinary tracts and a higher baseline risk of infection. [9]

The ongoing REINFORCE trial further demonstrated the uncertainty surrounding antibiotic prophylaxis in high-risk patients after cystectomy. This multicentre randomized trial was designed to compare individualized, urine microbiota-targeted antibiotic prophylaxis with empirical prophylaxis at ureteral stent removal. The development of this trial reflected increasing recognition that broad empirical antibiotic administration may not be optimal and that prophylaxis should potentially be tailored according to individual microbiological risk. [10]

The present study identified Escherichia coli as the predominant organism among culture-confirmed UTIs, followed by Klebsiella pneumoniae. The low number of infectious events indicated a low baseline risk of UTI and limited the statistical power to detect small differences between antibiotic and non-antibiotic groups. Therefore, the absence of a statistically significant difference suggested no demonstrable benefit of routine prophylaxis in the present low-risk cohort but did not establish definitive equivalence.

Current European Association of Urology (EAU) guidance generally recommends against routine antimicrobial prophylaxis for diagnostic cystoscopy. However, evidence regarding cystoscopy involving manipulation, particularly ureteral stent removal, remains heterogeneous. Available evidence, including the randomised controlled trial by Bradshaw et al., supports consideration of an antibiotic-sparing approach in appropriately selected patients undergoing uncomplicated stent removal. [11,3]

Antibiotic prescribing practices for ureteral stent removal have varied considerably among urologists, reflecting the lack of uniform evidence and differences in institutional protocols. Berrondo et al. reported substantial variation in prophylactic antibiotic use, highlighting the need for standardised, evidence-based antimicrobial stewardship strategies.[12]

The present study suggested that routine antibiotic prophylaxis did not significantly reduce post-procedural UTI following uncomplicated cystoscopic ureteral stent removal in low-risk patients. An antibiotic-sparing approach appeared appropriate in selected patients without active infection, while those with significant risk factors may benefit from individualized or culture-guided prophylaxis. Further large-scale studies are required to establish definitive recommendations.

Conclusion: The present study concluded that routine antibiotic prophylaxis did not significantly reduce the incidence of post-procedural urinary tract infection following uncomplicated cystoscopic ureteral stent removal in low-risk patients. An antibiotic-sparing approach may therefore be considered in appropriately selected patients without active infection or major risk factors. Future research should involve larger multicentre prospective randomised studies to validate these findings and establish evidence-based, risk-stratified recommendations. Further studies should also evaluate culture-guided prophylaxis in high-risk patients and assess the long-term impact of antibiotic reduction on antimicrobial resistance, adverse drug reactions, and healthcare costs.

References

1. Abbott JE, Han A, McDonald M, Lakin C, Sur RL. Are antibiotics necessary during routine cystoscopic stent removal? Transl Androl Urol. 2016 Oct;5(5):784-788.
2. Wolf JS, Jr, Bennett CJ, Dmochowski RR, et al. Best practice policy statement on urologic surgery antimicrobial prophylaxis. J Urol 2008;179:1379-90.
3. Bradshaw AW, Pe M, Bechis SK, Dipina T, Zupkas P, Abbott JE, et al. Antibiotics are not necessary during routine cystoscopic stent removal: A randomized controlled trial at UC San Diego. Urol Ann. 2020 Oct-Dec;12(4):373-378.
4. Lee JH, Muthukumar T, Kim J, Aull MJ, Watkins A, Kapur S, Hartono C. Antibiotic prophylaxis for ureteral stent removal after kidney transplantation. Clin Transplant. 2019 Mar;33(3).

5. Olivero A, Riccardi N, Ndrevataj D, Balzarini F, Cerasuolo M, Bottino P, Borghesi M, Dodi F, Terrone C. Flexible cystoscopy for ureteral stent removal without antimicrobial prophylaxis. A prospective observational study. Urologia. 2021 May;88(2):130-134.
6. Garcia-Perdomo HA, Jimenez-Mejias E, Lopez-Ramos H. Efficacy of antibiotic prophylaxis in cystoscopy to prevent urinary tract infection: A systematic review and meta-analysis. Int Braz J Urol. 2015;41:412–24.
7. Carey MM, Zreik A, Fenn NJ, Chlosta PL, Aboumarzouk OM. Should we use antibiotic prophylaxis for flexible cystoscopy? A systematic review and meta-analysis. Urol Int. 2015;95:249–59.
8. Costa Silva A, Pina-Vaz T, Pinho A, Ferreira I, Rocha A, Santos J et al. Evaluation of an Antibiotic Strategy for Ureteral Stent Removal After Kidney Transplant. Eur Urol Open Sci. 2025 Sep 24;81:37-43.
9. Kitano H, Watanabe E, Tadera K, Nakano Y, Tasaka S, Yukihiro K et al. Urine culture-guided antibiotic prophylaxis reduces febrile pyelonephritis after ureteral stent removal following radical cystectomy. World J Urol. 2026 Mar 18;44(1):249.
10. Vejlgaard M, Stroomberg HV, Ynddal MS, Moser C, Joensen UN, Røder A. Multicentre, open-label, phase IV, randomised trial testing superiority of individualised targeted antibiotic prophylaxis over empiric prophylaxis at ureteral stent removal following cystectomy: study protocol for the REINFORCE trial. Trials. 2025 Jul 28;26(1):258.
11. European Association of Urology. EAU Guidelines on Urological Infections. Arnhem: European Association of Urology; 2024.
12. Berrondo C, Ahn JJ, Merguerian PA, Lendvay TS, Shnorhavorian M. A survey of adult and pediatric urologists on current practice in antibiotic prophylaxis for ureteral stent removal. J Pediatr Urol. 2021;17(1):103-109.