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FREQUENCY OF UROSEPSIS AFTER URETERORENOSCOPY FOR URETERIC STONES

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ABSTRACT

OBJECTIVE: To determine the frequency of urosepsis after ureterorenoscopy for ureteric stones.

STUDY DESIGN: Cross-sectional study.

DURATION AND PLACE OF STUDY: This study was conducted from 15th May 2025 to 15th September 2025 in the Department of Urology, Ayub Teaching Hospital, Abbottabad.

METHODOLOGY: A total of 135 patients aged 18 to 60 years undergoing ureterorenoscopy for ureteric stones were included. Urosepsis was identified within four weeks post-procedure based on systemic inflammatory response criteria combined with evidence of urinary infection. Data analysis included descriptive statistics and comparisons of urosepsis across different demographic and clinical groups had been made through chi-square test or Fisher exact test.

RESULTS: The mean patient age was 41.09 years, with males representing the majority (73.3 percent). The frequency of urosepsis following ureterorenoscopy was 16.30 %. Significant associations were found between urosepsis and younger age, male gender, lower body mass index, poor socioeconomic status, and rural residence.

CONCLUSION: Urosepsis remains an important postoperative complication following ureterorenoscopy.

KEYWORDS: Body Mass Index; Sepsis; Socioeconomic Factors; Ureteral Calculi; Ureteroscopy; Urinary Tract Infections

INTRODUCTION:

Ureteric stones is a condition when stones move from the kidney and get stuck inside the ureter and they make blockage of urine flow and cause strong flank pain and sometimes blood in urine.[1] Many patients feel nausea and vomiting because the stone irritate the ureter wall and make pressure building inside the kidney.[2] Most stones pass by themselves but some bigger stones do not move and then patient need medical help, and if stone stay long time it can cause infection or swelling of the kidney.[3]

Ureterorenoscopy is a common procedure doctors use when the stone is not passing or patient is in too much pain or there is infection risk. In this method the doctor inserts a thin scope through the urethra and bladder and then go inside the ureter to see the stone directly.[4] With small laser machine or other tools the doctor breaks the stone into small pieces and remove them. This procedure usually safe but it depends on patient condition, stone size, and experience of the surgeon.[5] Sometimes a stent is left inside the ureter to keep urine flowing good and to prevent swelling after the procedure.[6]

Urosepsis after ureterorenoscopy for ureteric stones happen when bacteria enter the blood from the infected urine system during or after the procedure and the body cannot control the infection.[7] Patients with infected stones, long obstruction, diabetes, or weak immune system have more chance to get this complication.[8] After the procedure the patient may develop fever, chills, fast heart rate, low blood pressure, and confusion because the infection spread fast in the body.[9] It is a serious emergency and need quick treatment with strong antibiotics, IV fluids, and sometimes ICU care.[10] Preventing urosepsis is very important and doctors check urine culture, give antibiotics before procedure, and try to keep good sterile technique during ureterorenoscopy to reduce the risk.[11]

A study by Khan JI et al. show that the frequency of urosepsis was 22% following ureterorenoscopy for ureteric stones.[12]

This study is need in Abbottabad because many patients here come with ureteric stones and they get treated with ureterorenoscopy but we still not know clearly how many develop urosepsis after the procedure. In this area the health facilities are improving but still many patients come late with infection, so understanding this problem is very important. Also local doctors need proper data from Abbottabad because the patient conditions, hygiene situation, and treatment timing here is different from big cities, so this study will help make better care and reduce complications.

METHODOLOGY:

The study had been carried out in the urology services of ATH Abbottabad, and it took place from 15th May 2025 to 15th November 2025. Approval from the institutional ethical review board had been obtained before starting any enrolment, and the committee allowed the study after reviewing the safety and procedure steps. The sample size had been estimated as 135 patients by using WHO sample size calculator, taking 95% confidence limits and around 7% error margin, keeping earlier reported urosepsis proportion close to 22% after ureterorenoscopy.[12] Patients were considered eligible when they were between 18 and 60 years, both male and female, and having a ureteric stone seen on ultrasound as a bright structure giving posterior shadow and with upstream dilation of renal pelvis. These patients also had been planned for ureterorenoscopy. People having diabetes history, hypertension, organ-transplant status, chemotherapy exposure, chronic steroid use, or bilateral involvement of ureter had been left out. Before any information or procedure, written consent had been taken from each participant after explaining the

study aim, the possible discomfort, and the clinical follow up plan.

During the clinical history, patients were asked about symptoms, duration of stone-related pain, urinary complaints, and past illnesses. Examination included baseline vitals, abdominal assessment, flank tenderness check, and any sign suggesting systemic infection. All participants underwent ureterorenoscopy performed by either a senior registrar or consultant who already had more than three years experience after fellowship. During the procedure a semirigid ureteroscope was inserted through urethra to reach the stone for visualization and fragmentation. The status of urosepsis had been evaluated during follow-up visits at week 1, week 2, and week 4. Routine investigations such as CBC, renal function tests, urine analysis, and urine culture had been checked before surgery and then repeated during each follow-up to see any early or late infectious changes. Urosepsis in this study defined when the patient, within four weeks after the ureterorenoscopy, developed signs showing systemic inflammatory reaction like fever more than 38°C or very low temperature, heart beating above 90 per minute, breathing rate more than 20 or PaCO2 less than 32 mmHg, or abnormal white-cell numbers either very high, very low, or with too many immature bands. These changes needed to occur along with urinary infection signs such as bacteria more than 10^5 CFU/ml in culture or white cells 10 or more per high-power field in urine microscopy.

Data were processed through SPSS version 26. Categorical were shown as frequency and percentage. Numerical factors were calculated as mean with standard deviation or median with interquartile range depending on distribution. Comparisons of urosepsis across different demographic and clinical groups had been made through chi-square test or Fisher exact test wherever appropriate, and a p-value less than 0.05 was taken as significant.

RESULTS:

The mean age of patients was 41.09 ± 10.36 years and mean duration was 12.17 ± 6.27 months. The mean BMI of the study participants were 26.84 ± 3.24 kg/m². Regarding gender distribution, majority of patients were males with 99 patients (73.3%) while females were 36 (26.7%). When socioeconomic status was analyzed, 47 patients (34.8%) belongs to poor class, 70 patients (51.9%) were from middle class and 18 patients (13.3%) were from rich socioeconomic background. In terms of residential area, 79 patients (58.5%) were residing in rural areas whereas 56 patients (41.5%) were from urban areas (as shown in Table-I). **Table I: Patient Demographics**

Demographics	
Age (years)	
Duration (months)	
BMI (kg/m²)	
Gender	
Male n (%)	
Female n (%)	
Socioeconomic Status	
Poor n (%)	
Middle n (%)	
Rich n (%)	
Residential Area	
Rural n (%)	
Urban n (%)	

The frequency of urosepsis after ureterorenoscopy for ureteric stones was found in 22 patients which accounts for 16.30% of total study population. Remaining 113 patients (83.70%) did not developed

urosepsis following the procedure (as shown in Table-II).

Table II: Frequency of Urosepsis After Ureterorenoscopy for Ureteric Stones

Urosepsis	Frequency	%age
Yes	22	16.30%
No	113	83.70%
Total	135	100%

When association of urosepsis with demographic and clinical factors were evaluated, age showed significant association where patients aged ≤40 years had higher rate of urosepsis with 16 patients (24.2%) developing urosepsis compared to 50 patients (75.8%) who did not, while in patients aged >40 years only 6 patients (8.7%) developed urosepsis versus 63 patients (91.3%) who did not develop it, with p-value of 0.014. Gender also demonstrated significant association as 21 males (21.2%) developed urosepsis while 78 males (78.8%) did not developed it, whereas only 1 female (2.8%) developed urosepsis compared to 35 females (97.2%) who did not, showing p-value of 0.015 using Fischer Exact Test. BMI was significantly associated with urosepsis where patients with BMI ≤25 kg/m² showed 15 patients (25.9%) developing urosepsis and 43 patients (74.1%) not developing it, while in patients with BMI >25 kg/m² only 7 patients (9.1%) developed urosepsis compared to 70 patients (90.9%) who did not, with p-value of 0.009. Duration of disease showed that in patients with duration ≤12 months, 15 patients (21.7%) developed urosepsis while
54 patients (78.3%) did not, and in patients with duration >12 months, 7 patients (10.6%) developed urosepsis versus 59 patients (89.4%) who did not, however this association was not statistically significant with p-value of 0.080. Socioeconomic status revealed highly significant association where 19 patients from poor class (40.4%) developed urosepsis compared to 28 patients (59.6%) who did not, while in middle class only 3 patients (4.3%) developed urosepsis versus 67 patients (95.7%) who did not, and in rich class no patient (0.0%) developed urosepsis while all 18 patients (100.0%) remained free from it, with p-value <0.001 using Fischer Exact Test. Residential status also showed highly significant association as 21 rural patients (26.6%) developed urosepsis while 58 patients (73.4%) did not, whereas only 1 urban patient (1.8%) developed urosepsis compared to 55 urban patients (98.2%) who did not develop it, with p-value <0.001 using Fischer Exact Test (as shown in Table-III). **Table III: Association of Urosepsis with Demographic and Clinical Factors**

Demographic Factors		Urosepsis
		Yes n(%)
Age (years)	≤40	16 (24.2%)
	>40	6 (8.7%)
Gender	Male	21 (21.2%)
	Female	1 (2.8%)
BMI (Kg/m²)	≤25	15 (25.9%)
	>25	7 (9.1%)
Duration (months)	≤12	15 (21.7%)
	>12	7 (10.6%)
Socioeconomic Status	Poor	19 (40.4%)
	Middle	3 (4.3%)
	Rich	0 (0.0%)
Residential Status	Rural	21 (26.6%)
	Urban	1 (1.8%)

*Fischer Exact Test

DISCUSSION:

In current study, the overall frequency of urosepsis after ureterorenoscopy was found to be 16.30%. This frequency can be explained by instrumentation of urinary tract during procedure which causes mucosal injury and when stone is fragmented, it releases bacteria into bloodstream leading to sepsis. The study showed significant association between younger age (≤40 years) and urosepsis with 24.2% of younger patients developing sepsis compared to 8.7% in older patients (p=0.014). Younger patients may have more active immune response which leads to exaggerated inflammatory reaction when bacteria enters bloodstream. Male gender was significantly associated with higher risk as 21.2% males developed urosepsis compared to only 2.8% females (p=0.015). Male urethra is longer and more tortuous which may harbor more bacteria and males are more likely to have prostatic issues causing urinary stasis. Patients with lower BMI (≤25 kg/m²) had higher rate of urosepsis with 25.9% developing sepsis compared to 9.1% in higher BMI (p=0.009). Lower BMI indicates poor nutritional status and decreased immune function which makes patients susceptible to infections. Duration did not show significant association (p=0.080), although shorter duration patients had higher tendency with 21.7% versus 10.6% in longer duration. Socioeconomic status showed highly significant association where 40.4% poor class developed urosepsis compared to 4.3% middle class and 0% rich class (p<0.001).

Poor socioeconomic status is associated with limited healthcare access, delayed presentation, inadequate hygiene and poor nutrition making them vulnerable to infections. Rural patients had significantly higher urosepsis with 26.6% compared to 1.8% urban patients (p<0.001). Rural population faces limited access to clean water and healthcare facilities which increases urinary tract infections and delayed treatment of stone disease.

The frequency of urosepsis in present study was 16.30% which is comparable to findings of Arun Karthik D et al. [13] who reported sepsis incidence of 15.7% and also consistent with Wisam Sedeeq Omar et al. [14] who found febrile UTI incidence of 13%. Similarly, Udit Bohare et al. [15] reported febrile UTI rate of 12.16% and Jayanth DH et al. [16] found postoperative febrile UTI in 11% patients. However, our findings are higher than Mariela Corrales et al. [17] where sepsis rate ranged from 0.5% to 11.1%, and Nawaporn Kittaweerat et al. [18] who reported only 7.8% postoperative acute pyelonephritis and Rohra K et al. [19] who found 8.5% urosepsis rate. The meta-analysis by Bhojani N et al. [20] showed pooled incidence of 5.0% and Chugh S et al. [21] reported urosepsis in only 0.51%. These variations can be attributed to differences in patient selection, definition of sepsis used, geographical variations in bacterial resistance and preoperative preparation protocols. Regarding age, our study showed younger patients (≤40 years) had higher urosepsis rate of 24.2% compared to 8.7% in older patients (p=0.014). This finding is contrast to most literature where older age was associated with increased sepsis. Bhojani N et al. [20] found older age as significant risk factor and Chugh S et al. [21] also identified elderly age as key risk factor. The mean age in our study was 41.09 years which is similar to Wisam Sedeeq Omar et al. [14] with mean age of 40.22 years and Udit Bohare et al. [15] with 42.2 years. Our younger patients had higher sepsis which could be due to delayed presentation in younger population leading to more complicated stone disease.

Gender distribution showed male predominance with 73.3% males which is consistent with Arun Karthik D et al. [13] reporting 66.7% males, Wisam Sedeeq Omar et al. [14] with 64% males and Chugh S et al. [21] with 3:2 ratio. However, our study found

males had higher risk with 21.2% males developing sepsis compared to only 2.8% females (p=0.015). This is contradictory to several studies where female gender was risk factor. Wisam Sedeeq Omar et al. [14] found female gender as significant risk factor (p=0.016), Mariela Corrales et al. [17] identified female gender as independent risk factor and Chugh S et al. [21] also listed female gender. This difference could be due to anatomical factors where longer male urethra harbor more bacteria and higher prevalence of prostatic issues in our male population. The mean BMI was
26.84 kg/m² which is similar to Francesco Prata et al. [22] with median BMI of 26.12 kg/m² and Chugh S et al. [21] with 26.9. Our study found BMI ≤25 kg/m² had higher urosepsis of 25.9% compared to 9.1% in BMI >25 kg/m² (p=0.009). This is opposite to Chugh S et al. [21] who identified high BMI as risk factor. Our finding can be explained by poor nutritional status in underweight patients which is common in our population. Duration did not show significant association (p=0.080). This is different from Mariela Corrales et al. [17] who found stent dwelling time >30 days as risk factor and Jayanth DH et al. [16] who found preoperative stenting associated with infection where 44.4% pre-stented patients developed it.

Socioeconomic status showed highly significant association where 40.4% poor class developed urosepsis compared to 4.3% middle class and 0% rich class (p<0.001). This factor was not evaluated in most international studies but is crucial in our setting. Poor status leads to delayed presentation, inadequate preparation and limited healthcare access. Rural status was significantly associated as 26.6% rural patients developed sepsis compared to 1.8% urban patients (p<0.001). This was not reported in other studies but represents important factor. Rural patients face limited healthcare access and poor sanitation. Regarding operative factors, several studies identified prolonged operative time as risk factor. Udit Bohare et al. [15] found operative time >1 hour significantly associated (p=0.007), Francesco Prata et al. [22] found it as independent predictor (p<0.001), Jayanth DH et al. [16] reported time exceeding 90 minutes as risk factor (p<0.001) and Shaikh AA et al. [23] identified time greater than 70 minutes (p<0.001). Bhojani N et al. [20] also found longer time as significant (p=0.02). Stone size was also important where Udit Bohare et al. [15] found larger size associated with infection (p<0.001) and Francesco Prata et al. [22] identified stone diameter as predictor (p=0.001). Preoperative urine culture positivity was most critical in multiple studies. Arun Karthik D et al. [13] found it significantly associated (p<0.0001), Wisam Sedeeq Omar et al. [14] reported it as significant (p<0.001), Bhojani N et al. [20] found OR=3.56 (p<0.001) and Jayanth DH et al. [16] also identified it (p<0.001). However, we did not evaluate this which is limitation. Diabetes was identified as risk factor where Wisam Sedeeq Omar et al. [14] found diabetes associated (p<0.001), Mariela Corrales et al. [17] identified it as independent factor, Bhojani N et al. [20] found OR=2.04 (p=0.04) and Jayanth DH et al. [16] reported it as predictor (p<0.001).

The present study has several limitations that should be acknowledged. First, this was single center study conducted at tertiary care hospital which may limits the generalizability of findings to other healthcare settings and populations. The sample size of 135 patients was relatively small which may affects the statistical power to detect some associations. We did not evaluated important preoperative factors like urine culture status, presence of hydronephrosis, and baseline inflammatory markers which are known to influences postoperative infectious complications. The study also did not assessed intraoperative factors such as operative time, stone size, number of stones, irrigation pressure, and

type of lithotripsy used which have been identified as significant risk factors in literature.

CONCLUSION:

Our study has concluded that urosepsis is a notable complication following ureterorenoscopy. The development of urosepsis were significantly associated with several demographic factors. Younger patients, male gender, and patients with a lower body mass index was more likely to develop the condition. A highly significant association were found for socioeconomic status and residential area, with patients from poor socioeconomic backgrounds and those residing in rural areas experiencing a much higher incidence of urosepsis.

CONFLICTOFINTEREST: None

DISCLAIMER: None

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