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Incidence of Urosepsis in Patients Undergoing Flexible Ureteroscopy

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ABSTRACT
Introduction: Urosepsis is a systemic response to and potentially life-threatening sequela of urogenital tract infection.
Objectives: The main objective of the study is to find the incidence of urosepsis in patients undergoing flexible ureteroscopy**.**
Material and methods: This cross sectional study was conducted in Fatima Jinnah Medical University during June 2021 to January 2022. 241 patients full filling the inclusion criteria was included through the Emergency / OPD of hospital. An informed consent was obtained from patients. Demographic data (Name, age, gender, and stone size) was recorded.
Results: The data was collected from 241 patients. Out of 241 there were 118 males and 123 female patients. There was a significant difference in age between patients who developed sepsis and patients who did not develop sepsis. Patients who developed sepsis also had albumin concentrations <35 g/L, globulin concentrations ≥30 g/L, AGR <1.2, pre-operative fever, WBC count ≥10,000 cells/µL, pre-operative positive UC, positive urine WBC, and positive urine nitrite.
Conclusion: It is concluded that patients with solitary proximal ureteral stones are more likely to have post-fURS sepsis when they have positive pre-operative UC or low pre-operative AGR.

KEY WORDS: Flexible, Patients, Urosepsis.

INTRODUCTION

Urosepsis is a systemic response to and potentially life-threatening sequela of urogenital tract infection. It often results secondary to urinary tract obstruction associated with phenomena such as urolithiasis, tumor and stenosis, but it may also occur after urinary tract manipulation such as ureteroscopy. The development of bacteremia resulting from the dissemination of uropathogenic bacteria into the bloodstream marks the movement of the infection from a localized insult to systemic disease [1].

Approximately 10% to 12% of adults will receive a diagnosis of kidney stone disease during their lifetime, with the probability of having a stone varying according to age, gender, race, and geographic location [2]. Patients with symptomatic ureteral or renal stones are typically initially managed with pain control, medical expulsive therapy, and serial imaging to monitor stone position and assess for hydronephrosis [3]. However, persistent complications such as pain, nausea, and renal insufficiency are indications for definitive stone treatment. Several surgical options are available for treatment of stone disease, including ureteroscopy (URS), shockwave lithotripsy, and percutaneous nephrolithotomy. Treatment selection is largely dictated by patient preference, symptomology, and stone size/location [4].

URS is the most common interventional treatment for ureteral and renal stones. Ureteroscopic treatment options include using a basket to extract stone fragments and/or using a laser to dust stone fragments. Due in part to high success rates with these techniques [5]. URS is increasingly being used in higher-risk patients, which may increase procedural risk and the likelihood of postprocedural infectious complications. Previous meta-analyses have identified risk factors for infectious complications after URS for stone disease [7]. However, the definition of infectious complications in these reviews included a spectrum of diagnoses ranging from isolated fever or urinary tract infection (UTI) to urosepsis. Since patient prognosis and therapeutic strategies differ by diagnosis where urosepsis confers the greatest patient risk with potential for extended hospitalization, unplanned intensive care admission, or death,[5] identification of risk factors specifically for postoperative urosepsis may assist with risk stratification before URS [8].

Sepsis is one of the most intractable surgery complications, which leads to a longer length of stay and even lethal sepsis shock in some cases [5]. According to previous studies, postoperative sepsis is the primary complication with an incidence of 0.3-7.4% in fURS and 0.9-5.9% in PCNL [6–8]. It seems that different surgical procedures may lead to different incidence rate of sepsis. Thus, urologists make efforts to discover risk factors or preoperative predicting factors for postoperative sepsis. There have been several

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preoperative features identified as risk factors such as positive urine culture, female sex, and diabetes [9]. However, though the preoperative risk factor has been identified, it is hardly helpful for clinicians to make a clinical decision about which surgical procedure to choose, PCNL or fURS. Thus, we aim to compare the occurrence of postoperative sepsis between fURS and PCNL and analyze the difference of risk factors [10-11].

Objectives

The main objective of the study is:

- To find the incidence of urosepsis in patients undergoing flexible ureteroscopy**.**

MATERIAL AND METHODS

This cross sectional study was conducted in Fatima Jinnah Medical University during June 2021 to January 2022.

Inclusion criteria:

- Age 18 to 60 years
- history of fURS to treat unilateral, solitary, and proximal ureteral stones

Exclusion criteria:

- Ureteroscopy performed for non-stone disease
- anatomical renal abnormalities such as transplant kidney, solitary kidney, horseshoe kidney, and kidney duplication
- Not willing to participate

Data Collection:

241 patients full filling the inclusion criteria was included through the Emergency / OPD of hospital. An informed consent was obtained from patients. Demographic data (Name, age, gender, and stone size) was recorded. Then blood sample was taken by using 5cc syringe under aseptic measures and stored in vials containing ringer lactate to prevent clotting. All sample was sent to laboratory of the hospital for assessment of Ureteroscopy. Flexible ureteroscopy is used to remove the stone. If a double-J stent was inserted pre-operatively, it was removed at the beginning of surgery. Rigid ureteroscopy was routinely used for ureteral dilatation before fURS. A 0.035 mm guidewire was advanced through the urethral and ureteral meatuses to the renal pelvis under direct rigid ureteroscope vision.

DATA ANALYSIS

Data is entered and analyzed by SPSS version 25. Mean and SD is calculated for quantitative variables including age, place of birth, weight. Frequency and percentage is calculated for qualitative variables. Post stratification, chi square test is applied with p-value <0.05 considered as significant.

RESULTS

The data was collected from 241 patients. Out of 241 there were 118 males and 123 female patients. There was a significant difference in age between patients who developed sepsis and patients who did not develop sepsis. Patients who developed sepsis also had albumin concentrations <35 g/L, globulin concentrations ≥30 g/L, AGR <1.2, pre-operative fever, WBC count ≥10,000 cells/μL, pre-operative positive UC, positive urine WBC, and positive urine nitrite. Factors with no significant effect on sepsis include BMI, operation time, stone height, stone laterality, indwelling catheter, hydronephrosis, hypertension, coronary heart disease, diabetes mellitus, cholesterol level, creatinine level, and ASA score.

Table 1: Patients characteristics and analysis of predictors for post-operative sepsis after flexible ureteroscopy

Variable	Sepsis	Non-sepsis	P value
Age (yr), mean (SD)	52.7 (12.1)	48.5 (13.3)	0.043
BMI (kg/m^2), mean (SD)	24.0 (3.2)	24.3 (3.3)	0.497
Operation time (min), mean (SD)	75.6 (25.9)	71.7 (27.8)	0.365
Stone height, n (%)			0.202

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<10 mm	15 (4.5)	321 (95.5)	
≥10 mm	28 (6.6)	395 (93.4)	
Stone laterality, n (%)			0.083
Left	16 (7.1)	364 (92.9)	
Right	27 (4.2)	352 (95.8)	
Indwelling stent, n (%)			0.056
Yes	6 (12.0)	44 (88.0)	
No	37 (5.2)	672 (94.8)	
Hydronephrosis, n (%)			0.506
Yes	1 (2.2)	44 (97.8)	
No	42 (5.9)	672 (94.1)	
Hypertension, n (%)			0.485
Yes	11 (6.8)	151 (93.2)	
No	32 (5.4)	565 (94.6)	
Coronary heart disease, n (%)			1.000
Yes	0 (0)	11 (100)	
No	43 (5.7)	705 (94.3)	
Diabetes, n (%)			0.513
Yes	3 (4.8)	60 (95.2)	
No	40 (5.7)	656 (94.3)	
Serum cholesterol, n (%)			0.423
<5.17 mmol/L	38 (5.6)	646 (94.4)	
≥5.17 mmol/L	5 (6.7)	70 (93.3)	
Serum creatinine, n (%)			0.670
<133 μmol/L	35 (5.5)	601 (94.5)	
≥133 μmol/L	8 (6.5)	115 (93.5)	
Albumin, n (%)			0.001
<35 g/L	12 (15.6)	65 (84.4)	
≥35 g/L	31 (4.5)	651 (95.5)	
Globulin, n (%)			0.002
<30 g/L	18 (3.7)	465 (96.3)	
≥30 g/L	25 (9.1)	251 (90.9)	
AGR, n (%)			<0.001
<1.2	24 (15.1)	135 (84.9)	
≥1.2	19 (3.2)	581 (96.8)	
Pre-operative fever, n (%)			0.001
Yes	8 (21.1)	30 (78.9)	
No	35 (4.9)	686 (95.1)	
WBC, n (%)			0.005
<10,000 cells/μL	33 (4.8)	654 (95.2)	
≥10,000 cells/μL	10 (13.9)	62 (86.1)	
Urine culture, n (%)			<0.001
Positive	25 (34.2)	48 (65.8)	
Negative	18 (2.6)	668 (97.4)	
Urine WBC, n (%)			<0.001

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Positive	31 (9.1)	309 (90.9)	
Negative	12 (2.9)	407 (97.1)	
Urine nitrite, n (%)			<0.001
Positive	13 (37.1)	22 (62.9)	
Negative	30 (4.1)	694 (95.9)	

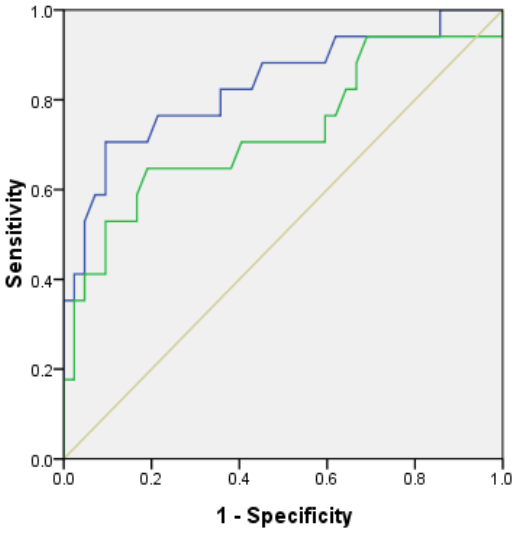

Figure 01: ROC curve for urine culture

DISCUSSION

Because of the considerable clinical and economic burden of urosepsis, identification of risk factors for this complication after URS would be particularly informative to patients, physicians, and health care policy makers. Although others have reported risk factors for generalized infectious complications, [12] this is the first systematic review with meta-analysis to specifically investigate risk factors for postoperative urosepsis after URS [13-14]. The overall risk of postoperative urosepsis was 5.0% in this review. Older age, comorbidities such as diabetes mellitus and ischemic heart disease, preoperative stent placement, positive urine culture, and longer procedure time were independently associated with increased postoperative urosepsis risk [15].

Patients with a positive urine culture often received targeted microbial therapy followed by confirmation of a second negative culture before URS; however, reporting among studies in this review was inconsistent [16]. Based on this limited evidence, it is plausible that prior antibiotic exposure may confer antibiotic resistance and greater infection risk after URS. In addition, a second negative test may not indicate absence of infection since negative midstream urine cultures are possible where infected urine is present proximal to the obstructing stone [1719].

CONCLUSION

It is concluded that patients with solitary proximal ureteral stones are more likely to have post-fURS sepsis when they have positive pre-operative UC or low pre-operative AGR. Older age, diabetes mellitus, ischemic heart disease, preoperative stent placement, a positive urine culture, and longer procedure time were associated with increased postoperative urosepsis risk.

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