



STUDY OF CLINICAL AND MICROBIOLOGICAL SPECTRUM OF UROSEPSIS ATTENDING TERTIARY CARE CENTER IN EASTERN UTTAR PRADESH

Nephrology

Dr Baitullah	As A Senior Resident In The Department Of Nephrology Himsr (Hamdard Institute Of Medical Science And Research) New Delhi
Dr Yogesh Gaur	Assistant Professor, Department Of Nephrology, Heritage Institute Of Medical Sciences
Dr RG Singh	Professor, Department Of Nephrology, Heritage Institute Of Medical Sciences, Varanasi
Dr Dilip Chaurasiya*	Assistant Professor, Department Of General Medicine, Heritage Institute Of Medical Sciences, Varanasi *Corresponding Author

KEYWORDS

INTRODUCTION

Sepsis is defined as universal, harmful inflammatory host response to infection which may lead to severe sepsis (acute organ dysfunction with suspected infection) and septic shock (severe sepsis and hypotension not reversed with fluid resuscitation)[1]. It is a critical situation, leading to the main cause of death of patients in non-cardiac intensive care.

The infection sites leading to severe sepsis or septic shock are respiratory tract in approximately 45% of patients, and urinary tract infections ranging from 9% to 31% of patients, followed by abdominal sites reaching from 19% to 32%.[2]

Pathophysiology of sepsis is complex and multifactorial. The response to sepsis is dependent on characteristics of both the host (comorbidities and immunosuppression) and the pathogen (virulence and organism load). Endothelial damage leads to coagulation abnormalities, and impaired tissue oxygenation, leading to organ failure. Sepsis and severe sepsis are life-threatening conditions encountered by clinicians, posing a huge burden on society because of increasing incidence in recent 30 years ranging from 8.7 to 19.7 %, with a high mortality rate ranging from 30% to 42%.[3]

The systemic inflammatory response syndrome (SIRS) is a clinical response that have been used to identify patients at high risk for rapid development of sepsis. These include fever, tachycardia, tachypnea, and elevated white blood cell count. Though in current years, the SIRS criteria is less in need but it continues to be useful warning signs. The Third International Sepsis Consensus Definition Task Force describes sepsis as "life threatening organ dysfunction due to dysregulated host response to infection". [1]

Urosepsis is a serious organ dysfunction caused by a dysregulated host response to infection initiating from the urinary tract. It is actually a life-threatening phenomenon that may occur after an ureteroscopic procedure. With the progressively widespread adoption of ureteroscopy, there is a worry that the rates of urosepsis may rise. It accounts for 9-31% of all cases and has a mortality of 20-40%.[4]

As the population ages, the occurrence of urosepsis is likely to rise. About 30% of all diseased patients, the infectious site is localized in the urogenital tract and may leads to infections of the parenchymatous urogenital organs, e.g., kidneys, prostate, or testicles. This may comprise obstructive diseases of the urinary tract, such as ureteral stones, stenosis of the collecting system, tumor formations, or anomalies of the urinary system.[3] Urosepsis may arise after operative procedure in the urogenital tract. In patients with nosocomial UTI treated in urology, the prevalence of urosepsis was, on average, about 12% in a multinational surveillance study.[5]

Hence, keeping in mind the rising prevalence of Urosepsis, this study is directed to analyze the clinical profile of urosepsis patients.

Aims And Objectives

Aim-

To find out the clinical presentation of cases with urosepsis in terms of clinical presentation, microbiological spectrum.

Objectives-

1. To study the clinical presentation of cases with Urosepsis.
2. To study the microbiological parameters.

MATERIAL AND METHODS

Study Area:

Department of Medicine HIMS, Varanasi.

Study Population:

Patients clinically suggestive of urinary tract infection, proven on urine routine microscopy, urine culture, urinary pus cell count and having leukopenia or leukocytosis and may or may not having symptoms of sepsis as fever, hypertension, giddiness, lethargy.

Study Design:

Cross-Sectional Observational Prospective Study.

Study Duration:

One year of study

Sample Size:

Based on the previous literature, the prevalence of complications in cases of urosepsis was 70% [5]. Sample size was calculated using formulae:

$$n = \frac{Z^2 \cdot p(1-p)}{E^2}$$

n = sample size

Z = Level of significance (at 95% confidence level, its value is 1.96)

P = probability (0.70)

Q = 1 - P (1 - 0.70 = 0.30)

E = Error (13% of prevalence)

$$n = \frac{(1.96)^2 \cdot (0.70) \cdot (0.30)}{(0.13)^2}$$

n = 97 (approx.)

So, by rounding off, final sample size will be taken as 100 cases fulfilling the eligibility criteria.

Inclusion Criteria:

Patients included in the study were clinically suspected UTI confirmed on urine routine examination Age 18-70 who presented with leukocytosis or leukopenia with clinical correlation to label as sepsis.

Exclusion Criteria:

1. Patients not giving informed consent.
2. Cases of sepsis other than urinary tract.
3. Patients with UTI without sepsis.

Detailed Research Plan:

Patient with a diagnosis of Urosepsis



Satisfying Inclusion Criteria



Detailed History, General and Systemic Examination



Biochemical Laboratory Investigations – Haemogram, Renal Function Tests, Liver Function Tests and Random Blood Sugar



Microbiologic Investigations – Urine Microscopy, Blood Culture & Sensitivity and Urine Culture & Sensitivity

A diagnosis of Urosepsis was made on the fulfillment of aforementioned criteria. All the patients admitted to the tertiary care hospital who satisfied selection criteria were analyzed and included.

Detailed history was taken and a thorough clinical examination was performed in all cases after prior written informed consent being taken. Data was collected in a predesigned, pretested proforma.

All the cases were subjected to the following investigations; Hemoglobin (Hb), White Blood Cell count (WBC), Platelet Count, Hematocrit; Liver function tests such as Serum Bilirubin, Alanine Transaminase (ALP/SGPT), Aspartate Transaminase (AST/SGOT), Alkaline Phosphatase (ALP), Serum Albumin, Serum Globulin, Total Proteins; Renal function tests such as Serum Creatinine, Blood Urea Nitrogen (BUN), Serum Sodium, Serum Potassium, Serum Uric Acid, Urine Microscopy, Urine Culture & sensitivity and Blood culture & sensitivity. Ultrasonography of Abdomen was also performed for all cases. All the other relevant tests pertaining to underlying cause were also performed.

Documentation of management that was done as per standard of care and underlying cause, was obtained. Patients' outcome was assessed in terms of improvement and deterioration of different parameters. The outcome end-points included were death (unfavorable outcome) and discharge (favorable outcome).

Data Analysis:

The data collected was entered in Microsoft Excel. Continuous variables (if any) were presented as mean $\pm$ SD; while Categorical variables were expressed in frequency and percentages. No tests of statistical significance was used as there was no null hypothesis and no comparison between two variables.

Requirements:

Animals – No animals were used in this study.

Drugs – No new drugs were used in this study.

Instruments – No special instruments were used in this study

OBSERVATION

Age distribution	(18-40yrs) 27% (41-60yrs) 31% (61yrs and above) 42%
Gender distribution	male 60% female 40%
Presenting symptoms	fever 72% lower urinary tract symptoms 58% abdominal symptoms 56% decreased urine output 39% dyspnea 28% bilateral pedal edema and/or anasarca 22% uremic symptoms 16%
Hypotension	male 64% females 36%
Examination signs	fever 72% tachycardia 66% Tachypnea 31% hypotension 25% edema 22% altered mental status 19% pallor 17% abdominal tenderness 7%
Laboratory Investigations	Renal dysfunction 84% abnormal wbc count 68% anemia 61% thrombocytopenia 43% metabolic acidosis 36% hepatic dysfunction 25% hyperglycemia 13% hypoglycemia 10%
Risk factors/comorbidities	Diabetes mellitus 25% Renal stone disease 24% Chronic kidney disease 7% Malignancy 7% PLHIV 7% Prostatomegaly 3% Alcoholic Liver disease 3% Cystitis 2%

	Cystitis 2% Urethral stricture 2% HELLP syndrome 1% Neurogenic bladder 1% Renal transplant 1% Pregnancy 1% SLE 1% Others 19%
Obstructive Uropathy causes	Renal stone disease 24% Carcinoma cervix 2% Ureterocele 2% Urethral stricture 1%
Urine Examination and Biochemical Analysis	Pus cells seen 95% Pus cells not seen 5%
Urine Culture and Sensitivity	E. Coli 49% Klebsiella pneumoniae 14% Pseudomonas 5% Enterococcus 4% Gram negative non fermented bacilli 1% Citrobacter koseri 1% Enterobacter 1% Proteus 1% Nil 24%
Blood Culture and Sensitivity	Coagulase negative Staphylococcus aureus 2% E. Coli 1% Enterococcus 1% Pseudomonas aeruginosa 3% Nil 93%
Ultrasonography imaging	Obstructive Uropathy due to Renal Stone disease 24% Cystitis 21% Chronic Kidney disease 14% Pyelonephritis 13% Obstructive Uropathy due to Malignancy (Cervix/Rectum/Prostate) 7% Prostatomegaly 4% Urethral stricture 2% Neurogenic Bladder 2% Normal 13%

DISCUSSION AND CONCLUSION

Urosepsis is a serious organ dysfunction caused by a dysregulated host response to infection initiating from the urinary tract.

Age And Sex Distribution:

In our study total 100 patients were included. Minimum age of the patient was 18 year and maximum age was 70 years. Out of 100 cases, 60% population were males while 40% were females.

Pednekar et al conducted a study of 100 patients among which 51 were males and 49 were females.[6]

This observation was different in compare with other previous studies viz. Shah BV et al, Rorland et al, Ooi BS et al, O'Sullivan DJ et al, Viggs et al, Jaspani et al.

In our study age group of 18-40 years had 27 patients of urosepsis while there were 31 patients had urosepsis in age group of 41-60 years. 42 patients were having urosepsis in age group of 61-70 years.

Subramani et al conducted a study of urosepsis in a intensive care unit and it concluded that most of the patients belong to age group of 60-70 years.

Pednekar et al conducted a study which concluded that urosepsis was present in 43% of the cases in the age group of 40-60 years, 35% cases of the age group more than 60 years and 22% cases were below the age of 40.[6]

Physical Symptoms

In our study, most common physical symptoms were found to be fever (72%) followed by lower urinary tract symptoms such as frequency, hesitancy, urgency and incontinence (58%), 56% patients were complaining of abdominal pain. Bilateral pedal edema and/or anasarca were found in 22% of cases and decreased urine output was found in 39% cases. Dyspnea was observed in 28% of patients. Uremic symptoms such as fatigue, nausea, vomiting and loss of appetite were

seen in 16% of patients.

Pednekar et al conducted a study which concluded that most common physical symptom was fever (67%), followed by increased frequency of micturition (59%), dysuria (44%) and abdominal pain (33%).[6]

In our study Hypotension was observed in 25 (25%) patients at the time of admission. Out of 25, 16 patients (64%) were male and 9 patients (36%) were females.

Pednekar et al conducted a study which concluded that 50% patients had shock in urosepsis. 20% patients were having multiple organ dysfunction syndrome while 54% patients were diagnosed as acute kidney injury.[6]

Laboratory Investigations Associated With Urosepsis

In our study Out of 100 patients, 95 (95%) cases showed pus cells in urine routine and microscopy. In other investigations, 84% patient had deranged renal function, abnormal WBC count were found in 68% patients. Metabolic acidosis was present in 36% of patients. Hypoglycemic episodes in 10 patients while 13 has hyperglycemia.

Urine Culture Associated With Urosepsis

Escherichia coli was the most common observed microorganism and found in 49 (49%) patient's urine culture sample. Klebsiella pneumoniae was the second most predominant microbe present in 14 (14%) patients followed by Enterococcus (4%) and Pseudomonas (5%).

Pednekar et al conducted a study which concluded that 39% of the patients had E. coli, and 10% had Klebsiella.

Culture Sensitivity

In our study, most of the isolated organisms were susceptible to antimicrobials like ampicillin and fluoroquinolones. E.coli isolates in majority of the patients were sensitive to both ampicillin and fluoroquinolones.

In present study Norfloxacin, Amikacin, Cefotaxime, Piperacillin-tazobactam and Ampicillin were found as efficient antimicrobials. This was in contrast to study done by Adalet Altunsoy et al where E.coli was shown to have resistance to fluoroquinolones[7]. Whereas other studies by Bonadio M et al, Shah B. V et al did presented similar results as found in present study.

Risk Factor Associated With Urosepsis

In our study, Obstructive Uropathy was the most common (28%) factor observed followed by Diabetes mellitus (25%). In obstructive Uropathy, Renal stone (24%) was most commonly associated with urosepsis.

Ultrasonographic Finding In Urosepsis

In our study all patient underwent ultrasonography imaging which resulted that 24% patients were having renal stone followed by 21% patients found to had cystitis. 14% patient had chronic kidney disease while 13% patients were diagnosed as pyelonephritis. In other significant findings, 7% patients had obstructive uropathy due to malignancy, 4% patients had prostatomegaly. 13% patients were having normal ultrasonography among 100 patients.

Summarizing the topic, Urosepsis is a life threatening organ dysfunction commonly seen in old male patients, with increased incidence in diabetics and most common risk factor being obstructive uropathy. On examination, fever, lower urinary tract symptoms, tachycardia, hypotension with deranged renal function, leukocytosis, anemia should be taken seriously to prevent poor prognosis.

To conclude, the best sepsis is undoubtedly the sepsis that can be prevented both from the perspective of patients and doctors. So, looking upon the study, symptoms and signs should not be neglected, public awareness and regular medical check ups with necessary treatments should be encouraged, to prevent future fatal outcomes.

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