Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20160211

Study of prognostic factors affecting outcome of urosepsis in a tertiary care hospital in Mumbai

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Received: 01 October 2015 Accepted: 16 November 2015

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ABSTRACT

Background: Urosepsis implies clinically evident severe infection of the urinary tract and/or the male genital tract (e.g. prostate) with features consistent with systemic inflammatory response syndrome. This research was aimed at studying various prognostic factors of urosepsis and its outcome.

Methods: We prospectively observed patients admitted at Lokmanya Tilak Municipal General Hospital (LTMGH), Mumbai with a confirmed diagnosis of urosepsis from January 1, 2014 to December 31, 2014. After collecting sociodemographic data, patients were worked up with blood culture, urine routine and culture and other relevant clinical data. Data were analyzed in SPSS statistical software (SPSS v20 Inc, Chicago, USA).

Results: 100 patients were included in the final of which 51 were males and 43 were aged 40-60 years. 49 patients had diabetes mellitus, 24 had a history of urethral procedures. 39% of the patients had *E.coli* and 40% of the patients reported no organisms. Additionally, 50% of the patients reported shock as a complication. Presence of pus cells in urine showed statistically significant association with mortality, duration of hospital stay and residual renal impairment.

Conclusions: Urosepsis is much prevalent but rarely studied disease. Various clinical and microbiological parameters of the patient are of prognostic value and can predict the clinical outcome.

Keywords: Kidney, Urospesis, Prognosis, Clinical outcome

INTRODUCTION

Urosepsis implies clinically evident severe infection of the urinary tract and/or the male genital tract (e.g. prostate) with features consistent with systemic inflammatory response syndrome. It may be associated with multi-organ dysfunction, hypo-perfusion or hypotension. Severe sepsis is usually associated with

pulmonary and abdominal infections with urinary tract infections (UTIs) accounting for about five per cent cases.² However, among the nosocomial infections, UTIs account for approximately 40% of the cases.^{3,4} Though sepsis is commoner in men than in women, it has been found that urosepsis is commoner in women than in men. While severe sepsis has a reported mortality rate of 20 to 42%, urosepsis may be associated with high mortality

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rates in special patient groups.⁵ Therefore, patients with urosepsis should be identified at an early stage and promptly treated to prevent development of organ failure and other complications.

Complicated UTI usually refers to an infection that occurs in a patient with a structural or functional abnormality, impeding urine flow, or in a host with altered defences or in patients with metabolic disorders like diabetes or azotemia. When complicating factors are present, antimicrobial resistance is more common and the response to therapy is often disappointing, even with agents active against the causative microbial pathogens. In addition, severe complications frequently occur which may lead to urosepsis, renal scarring or even end-stage renal disease. Drug treatment of urosepsis often has to be complemented with endoscopic and/or surgical intervention.

We come across cases of urosepsis very frequently and are a highly prevalent disease in the community, yet it is not commonly studied topic. Here in this study we have studied various prognostic factors of urosepsis and its outcome. Also we have studied various presentation and complications of urosepsis.

METHODS

Patient population

This is an observational, prospective study of patients admitted in Lokmanya Tilak Municipal General Hospital (LTMGH), Mumbai, India who are proven cases of urosepsis, following all inclusion and exclusion criteria studied over time period of hospital stay. Study duration was from January 1, 2014 till December 31st, 2014. Patients clinically suggestive of urinary tract infection, proven on urine routine microscopy, urinary pus cell count and having leucopenia or leucocytosis and may or may not having symptoms of sepsis as fever, hypotension, giddiness, lethargy etc. Patients included in the study were clinically suspected UTI confirmed on urine routine examination and who presented with leukocytosis or leukopenia with clinical correlation to label as sepsis. Patients excluded were those not giving consent for the study or when sepsis in that patient was not secondary to UTI or patients who were not having sepsis even in the presence of UTI.

Study setting

Mumbai is the most populous city in India, with an estimated metropolitan area population of 20.7 million according 2011 census. Greater Mumbai has a literacy rate of 94.7%, which is higher than the national average of 86.7%. Apart from Marathi, which is the native language, Hindi, Gujarati and English are spoken and understood well in this region. LTMGH, a 1400 plus bedded academic tertiary level hospital, is a major healthcare provider in Sion, Mumbai.

Data collection and analysis

Patients were informed regarding the aims and objectives of the study and those who gave written consent, were studied. All patients admitted in the medical wards of Lokmanya Tilak Municipal General Hospital, Mumbai who were clinically diagnosed and subsequently confirmed by standard laboratory diagnostic testing to have urinary tract and passed all inclusion and exclusion criteria infection were included. These patients were seated randomly admitted under various departments to minimize selection bias. Patients were studied for different prognostic markers. They underwent urine routine and microscopy, monitored serially with clinical status and cell counts. The outcome of patient was correlated with different prognostic markers. Treatment was changed from empirical antibiotic use to specific antibiotics as per culture report. For every analysis p value ≤0.05 from two-sided tests was considered statistically significant. All the raw data was entered in Microsoft excel sheets and analyzed in SPSS statistical software (SPSS Inc, Chicago, USA).

RESULTS

Table 1: Baseline characteristics of patient population.

Variable	Frequency			
Gender				
Male	51			
Female	49			
Age				
Less than 40 years	22			
40-60 years	43			
More than 60 years	35			
Physical symptoms				
Fever	67			
Dysuria	44			
Abdominal pain	33			
Hematuria	7			
Pus in urine	8			
Increased frequency of micturition	59			
Straining while micturition	11			
Blood culture				
Positive	2			
Negative	98			
Comorbid conditions				
Diabetes mellitus	49			
Past history of urinary infections	22			
Immunocompromised state	6			
History of urethral procedures	24			
History of urinary calculi	7			

During the study period, 109 patients fulfilled our inclusion/exclusion criteria. However, 100 patients were included in the final analysis because 9 patients refused to consent for the study. Of the 100 patients, 51 were

males and 43 were aged 40-60 years. The most common physical symptom was fever, followed by increased frequency of micturition, dysuria and abdominal pain. 49 patients had diabetes mellitus, 24 had a history of urethral procedures. See Table 1 for details. All included patients underwent microbiological testing of their urine sample. 39% of the patients had *E. coli*, and 10% had *Klebsiella*. Urine examination of 40% of the included patients reported no organisms (Table 2). Additionally, 50% of the patients reported shock as a complication (Table 3). We compared the presence of pus cells to three prognostic characteristics i.e. mortality, duration of hospital stay and residual renal impairment. We identified number of pus cells to be statistically significant to these three prognostic factors. See Table 4 for details.

Table 2: Microbiological profile of UTI in the patient population.

Organism	No of cases	%
Escherichia coli	39	39
Proteus vulgaris	09	09
Klebseilla	10	10
Enterobacter	01	01
Pseudomonas	02	02
No organism	40	40

Table 3: Complications in patients of urosepsis.

Complications	No	%
Shock	50	50
Multi-organ dysfunction syndrome	20	20
Acute kidney injury	54	54
No Complications	31	31

Table 4: Presence of pus cells related to different prognostic factors.

Mortalit Numbe y r of pus (number cells of		Duration of hospital stay (days)		>	Residual renal impair	
cens	deaths)	5	10	15	15	ment seen
<50 (n=34	l) 1	9	18	4	1	2
50-100 (n=27)	2	1	10	8	3	6
101-150 (n=15)	0	0	9	3	3	6
>150 (n=24)	6	3	12	4	2	5
p-value (chi square	e) 0.005	0.0)32			0.001

DISCUSSION

In this study we reviewed the clinical charts and followed 100 patients, randomly selected from various departments of the hospital, to avoid selection bias. But majority of

the patients were from medicine department although we included surgical, gynecological and medical patients. Urosepsis is a very common disease but apparently not a frequently studied topic, so the findings of our study add to the scare literature available on this topic.

UTI is more common in females. Anatomical structure of female urogenital tract is responsible for it e.g. short, straight urethra, close vicinity to anus etc. But the incidence of urosepsis is more in males than females. In general incidence of sepsis is more in male. In our study we found almost equal incidence of urosepsis in both genders. Post-menopausal women are at higher risk for UTI than younger women are, because they lack estrogen, which is essential to maintain the normal acidity of vaginal fluid. Urosepis is commonly said to be the disease of old age but we found 43% of the cases in the age group of 40-60 years, 35% cases of the age group more than 60 years age group and 22% cases were below the age of 40. Classically there is triad of dysuria, fever, and hypotension in case of urosepsis. Dysuria and increased frequency of micturition is a typical presentation of UTI. Our study shows that 67% of the cases had fever followed by 59%, 44% of the cases had increased frequency of micturition and dysuria while 8%, 11% of the cases had pus in urine and straining while micturition.

We found that old age and diabetics who were diagnosed with urosepsis had often presented with only generalized weakness. Studies by Wagenlehner FM, Weidner W et al revealed that gram-negative bacilli account for majority of the cases of urosepsis. These include Escherichia coli (50%), Proteus spp. (15%), Enterobacter and Klebsiella spp. (15%), and Pseudomonas aeruginosa (5%), which dominate the bacterial spectrum in urosepsis, while Gram-positive organisms are involved less frequently (15%). In our study, 39% of the cases had E. coli followed by 10%, 9%, 2% and 1% of the cases had Klebseilla, Proteus vulgaris, Pseudomonas Enterobacter in urine cultures respectively. 39% urine cultures were negative. This many culture negative results may be attributable to wrong sampling techniques e.g. collecting sample after giving antibiotics. Prevalence of positive blood culture is 7% in the previous studies but we found 2% blood culture positivity rate. In these cultures, consistently same organisms were not grown. This can be attributable to incorrect sampling methods or superadded infections.9

The incidence of UTI was 46.9 per 1000 person-years (95% confidence interval (CI) 45.8-48.1) among diabetes patients and 29.9 (95% CI 28.9-30.8) for patients without diabetes. Compared to the non-diabetes patients, the risk of UTI was 1.53 (95% CI 1.46-1.59) for all diabetes patients; and 2.08 (95% CI 1.93-2.24) for patients with previously diagnosed diabetes. In our study 51% of the cases had diabetes. Moreover, diabetics with poor glycemic control have a higher tendency of *E. coli* adherence.

Perurethral procedure is one of the risk factor for UTI. In our study 24% patients had history of one or the other perurethral procedure done. It itself is not strongly associated with urosepsis but urethral catheterization which is done commonly in patients of other comorbidity that comorbidity along with urosepsis lead to bad prognosis. Similarly urinary tract anomalies, calculi or obstructions are associated with recurrent urinary tract infection is also a risk factor for urosepsis. Benign prostatic hypertrophy is prevalent in old age. Stagnation of urine lead to UTI and old age is a risk factor for urosepsis. Urinary calculi is noted as one of the most common cause of UTI and in our study 7% patient had urinary calculus causing urosepsis. 12 Incidence of sepsis associated with obstructed uropathy and urinary stones treated surgically has also been reported in 1.28% of cases. 13 Rao et al found an incidence of septic shock after endoscopic manipulation for urinary stone in about 1% of treated patients. Sepsis is not so prevalent in cases of UTI secondary to calculus. As for development of sepsis other risk factors like diabetes, old age, and immunesuppression play important role.¹⁴

We didn't find any study correlating number of pus cells in the urine and its prognostic value in urosepsis. In this study we found there is significant effect on prognosis. Higher number of pus cells was associated with higher mortality, hospital stay as well as residual renal impairment.

CONCLUSION

Urosepsis is common, fatal, disease but it is easily preventable. Hospital acquired UTI is common and can be prevented by following proper guidelines. Urosepsis is much prevalent but rarely studied disease. Extensive study of this can form better prevention and treatment protocols as per different prognostic risk factors.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

 $institutional\ ethics\ committee$

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Cite this article as: Pednekar JL, Shinde S, Pednekar S. Study of prognostic factors affecting outcome of urosepsis in a tertiary care hospital in Mumbai. Int Surg J 2016;3:119-22.