



Urinary tract infection in renal transplant recipients – An experience from a tertiary care centre in South India

KEYWORDS

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ABSTRACT *Aim:* To find out the incidence, microbiological profile and risk factors associated with urinary tract infection in renal transplant recipients. *Patients and Methods:* We conducted a retrospective, observational study of 103 renal transplant recipients who underwent surgery (both live related and deceased donor) from January 2012 to December 2015 in our hospital. Demographic and clinical data were collected. Urine specimens were cultured for bacteria and fungi. *Results:* Of 103 kidney transplant recipients 52 (50.5%) developed UTI (male 35; 67.3% and female 17; 32.7%). Deceased (n=25; 69.4%) or live donor (n=27; 40.2%) had no significant association with the development of urinary tract infection. Most of the patients were asymptomatic (n=40; 76.9%). Most frequently isolated pathogens were *Klebsiella pneumoniae* (n=20; 38.4%) and *Escherichia coli* (n= 18; 34.6%). *Candida albicans* in 2 patients (3.8%). Use of induction agents, anti rejection therapy and occurrence of pre transplant UTI were found to have significant incidence of post transplant UTI. *Conclusion:* Incidence of urinary tract infection in renal transplant recipients was 50.5%. *Klebsiella* and *E. coli* were the main pathogens. Induction agents, anti rejection therapy and occurrence of pre transplant UTI were the risk factors significantly associated with post transplant UTI.

Introduction

The infectious complications of kidney transplant (KT) individuals are associated with significant morbidity and mortality¹. Approximately 80% of transplant individuals develop at least one infection during the first year after transplant². Among different types of infections, urinary tract infection (UTI) is the most common one (45%–72%) after kidney transplantation³. UTI is associated with the development of acute cellular rejection, impaired allograft function, allograft loss and may lead to death⁴. Recent retrospective studies have revealed that the development of UTI is more common in renal transplant recipients compared to general population. The predisposing factors for UTI include ongoing uremia, immunosuppression, vascular or urinary tract surgical injury, presence of urinary catheter and ureteric stents^{5,6}. Studies conducted and evaluated the risk factors for UTI yielded conflicting data among the recipients. Therefore, the present study aimed to investigate the risk factors for UTI and to study the causative organisms of UTI of south Indian kidney transplant recipients.

Materials and Methods

Study population

We conducted a retrospective, observational study of 103 kidney transplant recipients who underwent transplantation from January 2012 to December 2015 at Sri Ramachandra University, Chennai, India. This patient group included recipients with live related donor and deceased donor. Out of 103 kidney transplant recipients 52 (50.5%) had UTI. Based on the duration of removal of urinary catheter after transplantation these patients were divided into two groups such as >7 days (82.6%) and <7 days (17.3%).

Definition of UTI

Urine culture containing more than 10⁵ colony-forming units (CFU) per mL or more than 10³ CFU per mL in the presence of symptoms such as frequency, urgency and dysuria were considered as having UTI.

Statistical Analysis

Parameters were expressed in percentages (%) and mean values ± standard deviations. The chi-square test or Fisher exact test was used

to compare cross-tabulated categorical data between the UTI and non UTI groups. SPSS version 16.0 (SPSS Inc., Chicago, Ill, United States) was used for the statistical analysis. P values <0.05 were considered to be statistically significant.

Results:

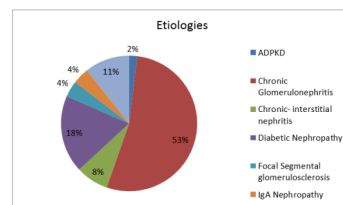
We analyzed demographic and clinical data together with urine cultures among 103 kidney transplant recipients. The demographic and clinical features of patients with UTI versus without UTI are presented in Table 1. The UTI group includes male 35 (67.3%) with mean age of 35.5±14.5 years and female 17 (32.7%) with mean age of 39.8±10.7 years (Table 1). Among the non UTI group Male=39 (76.4%) with mean age of 32.8 ± 11.4 years and Female=12 (23.5%) with mean age of 31.3±12.9 years (Table 1).

Table 1

		No UTI (n=51)	UTI (n=52)
Gender	Male	39 (76.4)	35 (67.3)
	Female	12 (23.5)	17 (32.7)
Age	Male	32.8 ± 11.4	35.5±14.5
	Female	31.3 ± 12.9	39.8±10.7
Organ Donor	Family member	30 (58.8)	17 (32.7)
	Different Family	13 (25.4)	25 (48.0)
	Cadaver	8 (15.6)	10 (19.2)

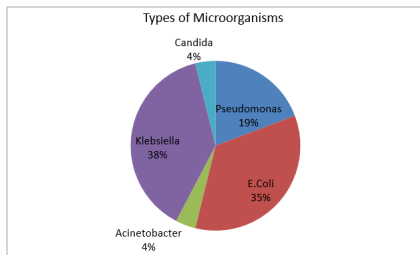
The etiologies of end-stage renal failure were: Chronic Glomerulonephritis (n=55; 53.3%), Diabetic Nephropathy (n=19; 18.4%); Chronic- interstitial nephritis (n=8; 7.7%), Focal Segmental glomerulosclerosis (n=4; 3.8%), IgA Nephropathy (n=4; 3.8%), ADPKD (n=2; 1.9%) and unknown cases (n=11; 10.7%) (Figure 3A).

Figure 3A



The most frequently isolated pathogens were Klebsiella pneumonia (n=20;38.4%), Escherichia coli (n= 18; 34.6%), pseudomonas (n=10; 19.2%), Acinetobacter (n=2; 3.8%) and 2 cases of fungal UTI caused by Candida spp (3.8%) (Figure 3B).

Figure 3B



Risk factors associated with UTI were compared between the groups (Table 2). The number of patients with UTI is higher in transplant recipients from deceased people. However, it did not differ significantly between the groups OR=1.53; 95% CI=0.64-3.62. Similarly, diabetes mellitus OR=2.02; 95% CI=0.90-4.52 and hypertension OR=0.85; 95% CI=0.26-2.75 are also not differing significantly between the non-UTI and UTI groups. This suggests that these factors are not contributing the UTI. Other factors such as induction agents (OR=3.50; 95% CI=1.55-7.89), pre transplant UTI (OR=2.76; 95% CI=0.96-7.89), Uro Procedure (OR=4.65; 95% CI=2.00-10.79) and anti rejection therapy (OR=9.45; 95% CI=3.45-26.0) were found to have a significant association between the groups (Table 2).

Table 2

		No UTI (n=51)	UTI (n=52)	OR (95% CI)	p-Value
Donor	Live	40 (78.4)	27 (51.9)	Reference	
	Diseased	11 (21.5)	25 (48.0)	1.53(0.64-3.62)	0.328
Induction	No	35 (68.6)	20 (38.4)	Reference	
	Yes	16 (31.3)	32 (61.5)	3.50 (1.55-7.89)	0.002
Pre Tx UTI	No	45 (88.2)	38 (73.0)	Reference	
	Yes	6 (11.7)	14 (26.9)	2.76 (0.96-7.89)	0.051
DJ stenting	No	31 (60.8)	13 (25.0)	Reference	
	Yes	20 (39.2)	39 (75.0)	4.65 (2.00-10.79)	0.002
Rejection therapy	No	45 (88.2)	23 (44.2)	Reference	
	Yes	6 (11.7)	29 (55.7)	9.45(3.45-26.0)	0.001
Diabetes	No	35 (68.6)	27 (51.9)	Reference	
	Yes	16 (31.3)	25 (48.0)	2.02 (0.90-4.52)	0.083
Hypertension	No	6 (11.7)	7 (13.4)	Reference	
	Yes	45 (88.2)	45 (86.5)	0.85 (0.26-2.75)	0.795

Among the UTI group, for 43 (82.7%) patients urinary catheters were removed 7 days after transplantation and for 9 (17.3%) 7 days after transplantation (Table 3). There was no significant association observed between the groups for recurrent UTI and non recurrent UTI (p=0.832), graft dysfunction (p=0.271) and symptomatic vs non symptomatic (p=0.635). But the other studied characteristics, such as upper UTI vs lower UTI (p=0.026) and UTI occurrence <6 months vs > 6 months (p=0.004) were found to have a significant association between the groups.

(Table 3)

		>7 days (n=43)	<7days (n=9)	OR (95% CI)	p-Value
Recurrent UTI	No	32(74.4)	7(77.7)	Reference	
	Yes	11(25.5)	2(22.2)	0.83(0.15-4.61)	0.832
Graft Dysfunction	No	20(46.5)	6(66.6)	Reference	
	Yes	23(53.4)	3(33.3)	0.43(0.09-1.96)	0.271

UTI	Upper	12(27.9)	6(66.6)	Reference	
	Lower	31(72.0)	3(33.3)	0.19(0.04-0.90)	0.026
Symptomatic	No	25(58.1)	6(66.6)	Reference	
	Yes	18(41.8)	3(33.3)	0.69(0.15-3.15)	0.635
UTI Occurrence	< 6Months	12(27.9)	7(77.7)	Reference	
	> 6Months	31(72.1)	2(22.2)	0.11(0.02-0.60)	0.004

Discussion

Urinary tract infection in renal transplant recipients is a major post transplant complication and it was regulated by several factors such as postoperative medical care, immunosuppressive status, epidemiologic contact, hygienic conditions, and socio economic status⁷. The infection status of KT recipients varies among different centers. In our study, 52 (50.5%) patients developed at least one episode of UTI. Studies conducted in Lithuania by Kanisaukaite et al⁸ in 2005 reported UTI in 37% of 57 patients and in Turkey by Memikoglu et al⁹ in 2007 was found UTI 41% of 136 patients. In Saudi Arabia Barbouch et al observed 53.69% of UTI among the 393 kidney-transplanted recipients¹⁰. Similarly, in Iran Poumard et al¹¹ reported 54% of 179 kidney transplant patients. In European population, Midtvedt et al¹² reported that deceased kidney recipients had higher rates of infections. In the present study, male gender (67.3%) was found in more number of UTI compared to female gender (32.7%). In contrast to this, in Turkey Memikoglu et al⁹ reported that the female gender was a risk factor for UTI.

Urine analyses were obtained on a routine basis at the time of removal of the bladder catheter irrespective of the presence of symptoms suggestive of urinary tract infections (UTIs). Recent study conducted recently was suggested that the removing urinary catheters as early as 24 h to 48 hours post-transplant to decrease UTI¹³. Other study conducted by Rabkin et al., in 1998 found that the removal of the catheter as early as 36-48 h after renal transplantation was favorable and feasible to avoid the UTI¹⁴. Our study had shown that the catheter removal was done in less than 7 days in 17.3% patients and more than 7 days in 82.7% patients. These suggest that early removal of bladder catheters appear to be an effective method to decrease the incidence of UTI in renal transplant recipients.

Antimetabolite (azathioprine or mycophenolate mofetil) based regimens that predispose to bone marrow suppression, and induction therapy with cell depleting antibodies such as antithymocyte globulin have been reported to have higher incidence of UTI^(15,16). In our study use of induction (OR=3.50; 95% CI=1.55-7.89) agents, anti rejection therapy (OR=9.45; 95% CI=3.45-26.0) and occurrence of pre transplant UTI (OR=2.76; 95% CI=0.96-7.89) were found to have significant association with post transplant UTI. In this study there was no significant association between diabetes mellitus and UTI

Most importantly, urosepsis with impairment of graft function is a potential long-term sequelae of recurrent UTI in transplant recipients was observed by several studies^{17,18}. In contrary to this our study found no significant association for graft dysfunction between the groups.

The asymptomatic bacteriuria is by far the most frequent infection after renal transplantation and it is also one of the most benign infections unless it is associated with urological, surgical or serious immune complications. Several lines of evidences have shown that asymptomatic bacteriuria is an infection of a benign character of after transplantation^{19,20}. But, our study failed to found significant association between the symptomatic vs non symptomatic groups. In our patients, Klebsiella (38.0%) and E. coli (35.0%) were the main organisms that caused UTI after kidney transplantation (Figure 3A) and the infective agent in 50% patients who suffered kidney allograft rejection, which is similar to several other studies conducted in different populations around the world²¹⁻²⁴. The second major cause

of infection in our patients was pseudomonas, which was cultured from ten patients (19.0%), among them 70% of patients was developed kidney allograft rejection. Candida infection may lead a serious consequence if it is not detected early stage. Catheter removal and amphotericin B is a good therapeutic option for these patients²⁵. In our study one patient had Candida infection and graft rejection was observed at day 19 and treated with antifungal agents.

Conclusion

Our study showed that the incidence of urinary tract infection in renal transplant recipients was 50.5%. Klebsiella and E. coli were the main pathogens. Use of induction agents, anti rejection therapy and occurrence of pre transplant UTI were found to have significantly associated with post transplant UTI. However, further studies are warranted with large number of sample size to conform the results.

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