Section: Emergency Medicine

Original Research Article

CLINICAL PROFILE AND OUTCOMES OF POST-RENAL TRANSPLANT PATIENTS ATTENDING THE EMERGENCY DEPARTMENT OF A TERTIARY CARE HOSPITAL" – A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Renal transplantation significantly improves quality of life in patients with chronic kidney disease (CKD), offering independence from dialysis. However, transplant recipients frequently visit emergency department (ED) due to various complications. Limited data exist on Indian scenario regarding these visits. This prospective observational study, conducted at a tertiary care hospital in eastern India, aimed to identify common causes and outcomes of ED visits in renal transplant recipients, the timing of such visits post-discharge, and associated risk factors for complications.

Materials and Methods: Adult renal transplant recipients (>18 years) not requiring haemodialysis were enrolled. Patient characteristics and investigation results were recorded. Patients were followed until discharge or death. Data were statistically analysed.

Results: Among 112 patients, diabetes (53.6%) and hypertension (44.6%) were the most common comorbidities, with diabetic nephropathy being the leading cause of CKD. The median time to ED visits post-transplant was 29 days. Over half (52%) required early readmission, a key predictor of recurrent hospitalizations. Fever (65.2%) was the most common symptom at presentation. Infections—especially urinary tract infections and gastroenteritis were the leading causes, though non-infectious issues like graft rejection and electrolyte imbalances were also significant. Surgical complications were noted in several cases. Sepsis frequently led to intensive care unit admission and acute kidney injury. Elderly, diabetic, obese patients, and those with multiple comorbidities were at risk of developing complications. 95% of patients were discharged successfully.

Conclusion: Early ED visits after kidney transplant are common and often infection-related. Prompt identification and management of high-risk patients can improve outcomes.

Keywords: Post-renal transplant; Diabetic nephropathy; Early hospital readmission; Infections; sepsis.

INTRODUCTION

Chronic kidney disease (CKD) is a major global health concern and a significant burden in India, as this is one of the leading causes of death. While diabetic nephropathy is the leading cause of chronic renal failure in India,[1] other contributors are hypertension, chronic glomerulonephritis (CGN), IgA nephropathy, and CKD of unknown cause. A vast majority of patients have end-stage kidney disease at the time of diagnosis and they require haemodialysis. Kidney transplantation, which began in India about 50 years ago, offers better quality of life and removes dialysis burden from CKD patients, though only about 3% of patients receive renal transplants as per a study done in 2016.[2] The number of renal transplants in India is increasing recently (>10000 living donor kidney transplants per year since 2022 as per National Organ and Tissue Transplant Organisation) due to more effective immunosuppressive drugs and advanced urologic surgery, including minimally invasive techniques. These factors improve surgical outcomes and reduce post-transplant medical and surgical complications.

Despite advancements, kidney transplant recipients remain vulnerable to various post-operative illnesses due to factors like their co-morbidities, immunosuppression, transplant surgery, and drug side effects, often leading to hospitalizations. Many of these illnesses are medical or surgical emergencies. Emergency physicians must recognize complications in post-transplant patients and identify critical symptoms early. Prompt diagnosis and treatment can prevent graft rejection and failure, metabolic acidosis, sepsis, and ICU admission, ultimately improving patient survival and outcomes.

Most of the data available regarding emergency department (ED) visits of renal transplant recipients are from Western, European and Middle-East countries while Indian researches are primarily focussed on peri-transplant medical and surgical issues, transplant surgery and post-transplant infections. Considering this lacuna, this study is aimed at studying the clinical profile and outcomes of post-renal transplant patients visiting the emergency to find out reasons of ED visit, time of presentation to ED after index hospitalization and risk factors leading to complications.

MATERIALS AND METHODS

Study design and setting: This prospective observational study was carried out in the Emergency Department of a tertiary care hospital in eastern India from July 2022 to June 2024.

Study participants: Kidney transplant recipients aged > 18years who visited the ED were included in the study after obtaining informed and written consent from the patients or their near relatives. We excluded patients who were on haemodialysis after transplant due to graft failure. A total of 112 patients satisfied our inclusion criteria.

Sample size calculation: Taking (Z1-α/2) as the standard value of Normal deviate (=1.96) where α is the level of significance, P as the proportion in a previous study and E as precision (error), we calculated our sample size.

In a previous study done by Uysal E et al.3, reason for hospital admission with infection was 68% (p=0.68). Taking 10% error, we get 83 patients as our sample size.

Methodology: Patients were selected as per study criteria. Patient's characteristics, symptoms, clinical findings, blood gas analysis were recorded as per study proforma by the researchers. Initial laboratory parameters i.e. Complete Hemogram, serum electrolytes and renal function tests, urinalysis, ECG, X-rays, USG were reviewed and patients were followed up till discharge or death.

Outcomes: We investigated the clinical profile, common reasons for ED visits, median time of presentation after index hospitalization, risk factors contributing to complications and outcomes in post-renal transplant patients.

Data analysis: All data were collected and entered into a pre-piloted excel sheet. SPSS 21.0 was used for statistical analysis. Average was reported using mean / median as appropriate. Risk factors for presenting complaints / diagnosis /outcome were assessed using regression analysis. All continuous variables were expressed as mean ± SD (standard deviation) and qualitative variables as numbers and percentages. Qualitative variables were compared between groups and compared by Chi square test or Fisher's exact test as appropriate. A p-value < 0.05 was considered as statistically significant.

RESULTS

Our study included 112 patients, mostly males (73.2%) and Hindus (82.2%). The mean age of participants was 50.23±11.06 years. Very few of them were underweight (7/112) or obese (4/112). Most of them (45%) belonged to body-mass index (BMI) group of 25-29.9 kg/m2.

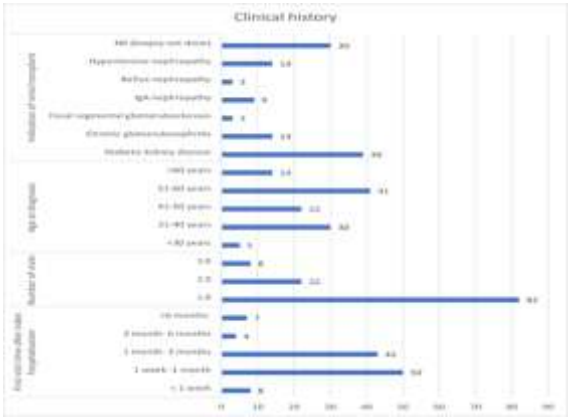

Figure 1

Clinical history of the enrolled patients is presented in [Figure 1].

Median time of 1st ED visit was 29 days. Early hospital readmission (EHR) i.e. admission within one month of index hospitalization, is found to be a key factor for multiple ED visits [Table 1].

Table 1: Association between first visit time after index hospitalization and number of visits

First visit time after index hospitalization	> 1 visit	Single visit	Total
≤ 1 month	23	45	68
>1 month	7	37	44
Total	30	82	112

Chi-square test; $\chi 2 = 4.37$, p value= 0.03 (Significant), Odds Ratio (OR) = 2.7 (1.04,6.99)

Diabetes (53.6%), hypertension (44.6%) and hypothyroidism (22.3%) were the major co-morbidities found in our participants. Hepatitis B positivity, chronic heart failure and peripheral vascular disease were other important co-morbid conditions found.

Common symptoms at presentation to ED were fever (65.2%), nausea-vomiting (46.4%), abdominal pain (42.9%), reduced urine output (31.3%), dysuria and haematuria (23%) and loose stool (18%). Other important symptoms among the patients in our study were low back pain, palpitation, accelerated hypertension, cough, breathlessness, pain at graft-site.

Dehydration (34%), pallor (19%) and pedal oedema (15%) were important physical examination findings in the patients whereas metabolic acidosis (35.71%) was found to be the most common blood gas abnormality.

Mean vital parameters and blood gas analysis findings are described in [Table 2].

Table 2: Mean vitals and blood gas findings in the study population

Vital parameters in study participants	
Parameters	**Mean ± Standard deviation (SD)**
Pulse rate	104.08 ± 11.84
Systolic blood pressure	145.29 ± 24.45
Diastolic blood pressure	84.46 ± 13.53
SPO2	96.45 ± 2.72
CBG	155.87 ± 49.7
Blood gas analysis results	
pH	7.39 ± 0.08
HCO3-	17.75 ± 3.40
pCO2	28.48 ± 6.43
Sodium	128.11 ± 9.28
Potassium	4.40 ± 0.76
Lactate	2.23 ± 1.00

Infections were the most common diagnosis after presentation to ED accounting for >70% of cases. Among non-infectious causes, peri-graft collection, graft rejections (antibody mediated > cell mediated), electrolyte imbalances were common [Figure 2].

Sepsis (24.11%), acute kidney injury (21.43%) were the most common medical complications occurred in our patients followed by graft-pyelonephritis (6%). Additionally, graft dysfunction (18%) was associated with various factors like graft rejection and infections like BKV, CMV. Post-surgical complications were found out to be a risk factor [p 0.01; OR 5.5 (1.25, 24.27)] for graft dysfunction. 20% of the patients required ICU admission during the hospital stay. 8 patients required intervention to manage post-surgical complications. Two among the transplanted patients (2/112) required haemodialysis and graft loss (<1%) was rare.

Patients aged over 50 years [p 0.01; OR 2.94 (1.25, 6.88)] and BMI of > 25 [p 0.019; OR 2.89 (1.16, 7.19)] were linked to have infections but multiple hospital visits (p 0.003) and diabetes (p 0.005) increased the risk of infections to larger extent (7.17 and 3.26 times respectively).

Risk factors for developing sepsis among post-transplant patients are shown in [Table 3].

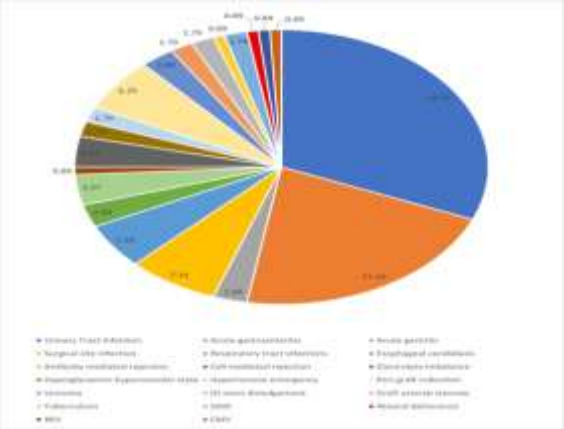

Figure 2

Table 3: Risk factors associated with Sepsis (n= 27)

Variables	Frequency (%)	p Value	OR
Age > 50 years	19	0.02	2.776 (1.11, 7.40)
Number of visits >1	11	0.02	2.93 (1.12, 7.62)
DM	20	0.01	3.214(1.23, 8.397)
Comorbidities >2	19	<0.0001	8.25(3.125, 21.78)

Sepsis was found to be a major factor in our study causing acute kidney injury [p < 0.001; OR 8.07 (2.96,22.01)] and intensive care unit (ICU) admission [p = 0.0004; OR 5.38 (2.00, 14.46)]. Other factors associated with ICU disposition are listed in [Table 4].

Table 4: Risk factors associated with ICU disposition (n= 23)

Variables	Frequency (%)	p Value	OR
Age > 50 years	17	0.017	3.31 (1.19, 9.19)
BMI>25	14	0.03	2.77 (1.08, 7.11)
Comorbidities >2	13	0.01	3.32 (1.29, 8.56)
Sepsis	12	0.0004	5.38 (2.00, 14.46)
Post surgical complications	6	0.001	7.5 (1.91, 29.46)

Only 6 patients in our study died and rest all were discharged (106/112).

DISCUSSION

Majority of our patients were over 50 years old (mean age 50.23 years), male (73.2%), and Hindu (82%). This demographic profile is consistent with previous studies like the studies of Uysal et al, McAdams-Demarco et al and Tavares et al, which found a male preponderance among renal transplant recipients. However, the average age in our study population was slightly higher than that of other studies.[3-5]

Diabetic kidney disease (DKD) was the most frequent cause of renal transplants, followed by CKD of unidentified causes (biopsy not done). Other causes of end-stage renal disease (ESRD) identified in our study include chronic glomerulonephritis, hypertensive nephropathy, IgA nephropathy, reflux nephropathy, and focal segmental glomerulosclerosis. Our result is slightly different from that of Kumar A et al,[6] who determined that diabetes, chronic glomerulonephritis, and chronic interstitial nephritis were the main causes of ESRD in >80% cases in their study.

In our study, 73% of patients had their first ED visit, and 30 had multiple visits. The median time to first ED visit was 29 days, and over half of the patients (58/112) had an early hospital readmission (EHR). Comparative studies that were conducted in Western countries found varying EHR rates of 31% (McAdams-Demarco et al),[7] 27% (Tavares et al)[5] and 12% (Jesse D. Schold et al).[8] Our higher EHR rate could be attributed to socioeconomic status, hygiene, and health awareness. Specific reasons for higher EHR are difficult to recognise as limited studies are available among Indian population.

Notably, early hospital readmission (EHR) was a significant risk factor for multiple ED visits, which is consistent with McAdams-Demarco MA et al,[7] results. Among 30 patients with multiple ED visits in our study, 23 had their first visit within one month of the index hospitalization i.e. EHR.

We found diabetes, hypertension and hypothyroidism as the most prevalent co-morbidities. Congestive heart failure, peripheral vascular disease, HBsAg positive status, and chronic hepatitis were among the other comorbidities. Similarly, Tavares et al,[5] shown that the most common comorbidities in their study population were diabetes and hypertension. Post-renal transplant patients were more likely to visit the emergency department (ED) if they had peripheral vascular disease, complicated diabetes, congestive heart failure according to the study of Jesse D. Schold et al.[8]

In this study, fever was the most common presenting symptom among post-transplant patients, followed by nausea-vomiting, abdominal pain, oliguria, diarrhoea. Similar studies by Uysal et al,[3] and Tokalak I et al,[9] also found fever to be the most common reason for emergency department visits. Less common symptoms included chest pain, cough, and breathing difficulties. Many patients (34%) had dehydration at the time of presentation, and metabolic acidosis was the most common blood gas analysis finding (36%) in our study with a mean lactate level of 2.23. The most common electrolyte abnormality detected in our study was hyperkalaemia. These findings are consistent with those of study conducted by Pochineni V et al,[10] who found metabolic acidosis and electrolyte imbalances, including hyperkalaemia to be the common issues in post-renal transplant patients.

Most of patient were diagnosed to have infections (>70%), with urinary tract infections (44.3%) being the most frequent cause of infection followed by gastrointestinal infections. This is in line with research by Kumar A et al.6, Pourmand G et al,[11] and Kavak N et al,[12] which also determined that UTIs are the commonest. Tuberculosis and Viral infections such as BK virus, CMV were less frequently found in our study in contrast to the study by Kumar A et al,[6] showing higher incidences of tuberculosis and CMV infections.

Graft rejections (4.5%), of which 80% were antibody-mediated rejection, and peri-graft collection (6.25%) in post-operative cases were the common non-infectious conditions presented to the ED. These results are in line with research by Kavak

N et al,[12] and Reyna-Sepúlveda F et al,[13] which found that post-operative complications, such as vascular and urological problems, and graft dysfunction were major concerns for patients those who received a kidney transplant.

The main risk factor attributed to AKI was sepsis (p <0.001, OR 8.07). Fiorentiono et al,[14] Trzeciak et al,[15] and Frietas et al,[16] found severe sepsis and infections were the prime reason for ICU admissions due to AKI in post-renal transplant patients. Graft dysfunction is significantly associated (OR 5.5) with complications related to transplant surgery like graft arterial stenosis, urinoma, peri-graft collection. Older age, higher BMI, multiple comorbidities, sepsis and post-surgical complications were found to be the risk factors associated with need for ICU admission. Requirement of haemodialysis (1.79%) and graft loss (<1%) were less frequent, in line with research by Trzeciak et al.[15]

Almost all the patients (95%) in our study were discharged from hospital.

CONCLUSION

Emergency department (ED) visits are frequent for post-kidney transplant patients within three months of transplant and the median time of visit being around 1 month. The risk of multiple hospitalizations is considerably increased by early hospital readmissions. Diabetic nephropathy is leading cause of CKD requiring renal-transplant. The most frequent presenting complaints are fever, gastro-intestinal symptoms like pain abdomen, nausea, vomiting, loose stool, Genito-urinary symptoms like dysuria, oliguria, haematuria, graft-site pain. These patients are prone to develop metabolic acidosis and dehydration. ED visits are mostly caused by infections, especially urinary tract infections and acute gastroenteritis. Graft rejection and post-operative surgical complications are frequent non-infectious causes of ED visit and these are linked to graft dysfunction. Diabetes, age more than 50 years, frequent hospitalizations, and presence of multiple comorbidities including obesity carry risk for developing complications like sepsis, acute kidney injury (AKI), and intensive care unit (ICU) admission. Early assessment and diagnosis based upon the clinical profile, quick decision-making regarding treatment will not only prevent complications in renal transplant recipients, also may help discharge from the hospital mostly.

Limitations: It is important to recognize the various limitations of this study. First off, the results may not be as broadly applicable as they could be due to the small sample size. Second, the results and complications related to deceased-donor transplants could not be evaluated because the study only included living-donor transplants. Furthermore, most participants were within a year of receiving a transplant, which may not accurately reflect long-term complications and results. Additionally, peri-transplantation medical and surgical concerns were not taken into account in the study, which would have allowed for a more thorough comprehension of post-transplant complications. These drawbacks emphasize the necessity of additional research among Indian patients with bigger sample sizes and more varied populations in order to validate and build upon these results.

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