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Outcomes of patients coming to the emergency department after kidney transplantation

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ABSTRACT

Introduction: In kidney transplantation (KT) practice, improvements in patient care led to increased graft and patient survival. This study aimed to determine the symptomatology of KT patients presenting to emergency department (ED), their final diagnoses, and outcomes.

Material and Method: Data including demographic data (age and gender), chief complaints (CCs), number of ED presentations, ED presentation date, KT date, donor type (live/deceased), patient disposition (discharge/admission), final diagnosis, and outcomes (acute renal graft dysfunction/graft loss/death) were retrieved and analyzed.

Results: Twenty-five KT patients presented to ED during the study period. These patients presented to ED for 46 times with 50 CCs. Fever was the most frequent CC (20%). The ED presentation led to a final diagnosis of infection in 32 presentations (69.4%). The most frequent infection was urinary tract infection (UTI) (26.1%) followed, by acute gastroenteritis (17.4%) and upper respiratory tract infection (17.4%). Acute graft dysfunction was the most common "non-infectious diagnosis" (17.4%) followed by cardiovascular disease (8.5%). The ED presentation led to admission in 32.6% (15/46) of the cases. Among 15 admissions, 7 (46.7%) were due to UTI. No rejections, graft loss, or mortality occurred following any ED presentations.

Conclusion: When evaluating KT patients in the ED, physcians should bear in mind that they could have an infectious pathology that is often associated by fever, also they should check for acute graft dysfunction and cardiac pathologies.

Keywords: Emergency medicine, kidney transplantation, urinary infection, fever

INTRODUCTION

End-stage renal disease (ESRD) is rising in prevalence year after year (1,2). The rise in the predicted lifespan and the prevalence of systemic disorders such as diabetes mellitus and hypertension, both of which may result in ESRD, increased the overall number of individuals diagnosed with ESRD. Therefore, an increasing number of patients need renal replacement therapies (RRTs) (3). Although hemodialysis or peritoneal dialysis can be performed in patients with ESRD, it is widely accepted that kidney transplantation (KT) is the gold standard RRT method. In KT practice, the introduction of novel immunosuppression (IS) agents and improvements in postoperative patient care led to increased graft and patient survival.

On the other hand, these factors increased the utilization of emergency departments (ED) by KT recipients (4). These patients may present to ED due to either KT-related or KT-unrelated causes. However, emergency physicians should consider the fact that these patients are KT patients regardless of the chief complaint (CC) since these patients are on IS agents that are involved in various drug interactions and given for treating the CC may impair the graft function. Moreover, it should also be considered that IS may mask the classical signs of the condition (5). Therefore, emergency physicians should not only be familiarized with the emergency care of KT patients but also be familiar with their various presentations (3,5-20).

This study aimed to determine the symptomatology of KT patients presenting to ED, their final diagnoses, and outcomes in a newly established KT program.

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MATERIAL AND METHOD

The study was carried out with the permission of the University of Health Science Dışkapı Yıldırım Beyazıt Training and Research Hospital Ethics Committee (Date: 14.06.2021, Decision No: 113-01). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The data of the KT patients who presented to the ED between January 2017 and January 2021 were reviewed retrospectively. Patients who underwent KT at another transplant center and those with incomplete data were excluded. Demographic data (age and gender) of the patients and additional clinical data including CC, number of ED presentations, ED presentation date, KT date, donor type (live/deceased), patient disposition (discharge/admission), final diagnosis and outcome (acute renal graft dysfunction/graft loss/death) were retrieved from patients' electronic health records. We defined acute renal graft dysfunction or acute kidney injury (AKI) as the rise of serum creatinine level of ≥50% from baseline in the absence of an infectious diagnosis (4).

All data were entered into a previously composed database and they were analyzed by the Statistical Package for Social Sciences (SPSS 13.0) software. Data were presented as means±standard deviations or frequencies and percentages.

RESULTS

Our hospital KT program was established in January 2017. Twenty-seven KT cases were performed until January 2021. All KT patients were monitored by the same team, and they were all instructed to go to the same hospital's ED in the event of an emergency. While giving these directions, we considered the fact that family medical practice has not yet been established in Turkey and our KT program was a new program with a relatively low number of KTs. A retrospective assessment of medical records indicated that 25 of the 27 KT patients came to the ED during the research period. All KT patients were monitored by the same team, and they were all instructed to go to the same hospital's ED in the event of an emergency. While giving these directions, we considered the fact that family medical practice has not yet been established in Turkey and our KT program was a new program with a relatively low number of KTs. A retrospective assessment of medical records indicated that 25 of the 27 KT patients came to the ED during the research period The age range of the study patients was (25-67) with a mean of 48±13. Among these 25 patients, 19 (76%) were males while 6 (24%) were females 16 (64%). Live donor KT was performed in 16 (64%) cases, and 9 (36%) received deceased donor KTs. In total, these patients presented to ED for 46 times, corresponding to 1.84 ED presentations per KT patient (**Figure 1**).

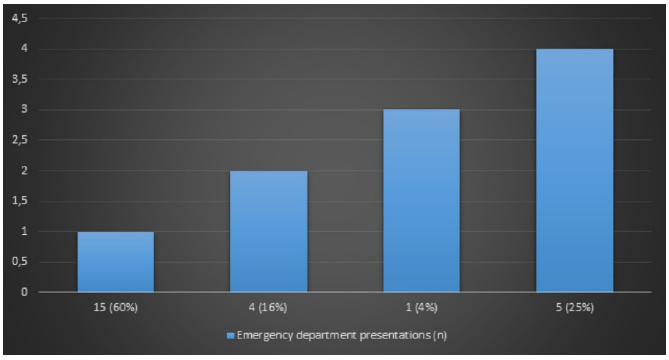

Figure 1. Distribution of patients as per number of emergency department presentations.

Among 25 KT patients, 3 (12%) developed delayed graft function (DGF). While 1 of these patients presented to ED for 4 times, the other two presented once and twice. During the 46 ED presentations, KT patients reported 50 CCs. These CCs and their rates are displayed in **Table 1.** Fever was the most frequent CC, followed by abdominal pain (20% and 16%).

Table 1. Frequency of chief complaints upon presentation to the emergency department

Chief complaint	Number (n)	Percentage (%)
Fever	10	20
Abdominal pain	8	16
Decreased oral intake	6	12
Diarrhea	5	10
Nausea/vomiting	5	10
Dysuria	4	8
Cough	2	4
Sore throat	2	4
Dyspnea	2	4
Hypertension	1	2
Headache	1	2
Chest pain	1	2
Backache	1	2
Wrist pain	1	2
Rectal bleeding	1	2

The time interval between KT and ED presentation was (14-1159) days. The final diagnoses of the patients are shown in **Table 2**.

Table 2. Final diagnoses of the patients

Infectious diagnoses	Number (n)	Percentage (%)
Urinary tract infection	12	26.1
Acute gastroenteritis	8	17.4
Upper respiratory tract infection	8	17.4
Lower respiratory tract infection	4	8.5
Total	32	69.4
Non-infectious diagnoses	**Number (n)**	**Percentage (%)**
Acute kidney injury	8	17.4
Cardiovascular disease	4	8.5
Wrist fracture	1	2.3
Hemorrhoids	1	2.3
Total	14	30.6

The ED presentation led to a final diagnosis of infection in 32 among 46 presentations (approximately 69.4%). The most frequent infection was UTI (26.1%) followed by AGE (17.4%) and URTI (17.4%). None of the respiratory tract infections encountered in our series was diagnosed with coronavirus disease-2019 (COVID-19). Acute renal graft dysfunction or AKI was the most common diagnosis in the "non-infectious diagnoses" category, with a rate of 17.4%. It was followed by CVD (8.5%). Our analysis elucidated that 32.6% (15/46) of the ED presentations were followed by admission of the patient. Among these 15 admissions, 7 (46.7%) were due to UTI. Seven of 12 patients diagnosed with UTI (58.3%) were admitted.

In this cohort, the remaining 8 of 15 patients who were admitted were diagnosed with AGE (3/15, 20%), LRTI (2/15, 13.3%), AKI (2/15, 13.3%), and wrist fracture (1/15, 6.7%). No rejections, graft loss, or mortality occurred following any ED presentations.

DISCUSSION

Both the number of KT cases and the survival rate of kidney grafts are growing globally (1). As a result, the likelihood of an emergency physician seeing a KT patient increases. Due to the fact that KT patients are a vulnerable patient group on continuous IS, they may come to the ED with a broad variety of symptoms (4). These patients have a low threshold for coming to the ED, since transplant teams instruct them to prioritize any uncommon symptoms and to present to either the transplant outpatient clinic or the ED, depending on the time of presentation (working hours vs. out of working hours). This strategy is more prevalent in nations or places where family medicine is still in its infancy (7). Additionally, newly formed transplant centers may use the same strategy, since KT team members feel more secure knowing that their patients will get treatment on schedule. Regardless of the reason for this practice, it places an additional stress on emergency doctors. Therefore, emergency doctors must be conversant with the symptomatology of KT patients who present to EDs, the most often encountered diagnoses, and their outcomes.

It is known that IS paves the way for infectious diseases, and KT patients may be affected by either opportunistic or non-opportunistic infections (4). Tokalak et al. (7) reviewed the data of 78 KT patients who presented to ED and reported that the most frequent CC was fever (26.9%) and the most frequent diagnosis was infection in their series. The admission rate was 57.7% in this cohort. Infection was also the most common diagnosis (77.8%) among those who were admitted. Our findings are in line with this study. Fever was the most common CC (20%) in our series. Moreover, infectious diagnoses were more common than non-infectious ones both in our entire cohort (69.4 vs. 30.4%) and among those admitted to the hospital. However, our admission rate (i.e. 32.6%) was lower than the rate reported by Tokalak et al. (7), and respiratory tract infections were more frequently diagnosed than UTI (54.2 vs. 5.7%) in their study. While evaluating these results, it is necessary to consider the sample sizes of the two research (78 vs. 25)

Kartal et al. (3) evaluated data from 163 KT patients who reported to the ED. They noticed that UTI was the most often diagnosed condition in their series (16.6 percent). Their admission rate was 40%, and they admitted 59.3 percent of patients diagnosed with UTI. UTI was followed by URTI (12.3 percent) and AGE in this dataset (11.7 percent). According to these experts, KT patients with UTI and systemic manifestations such as fever and tachycardia should be hospitalized. Our methodology and conclusions paralleled those of Kartal et al (3). The most frequently diagnosed conditions in our series were likewise UTI, URTI, and AGE, and the admission rates were comparable across the two studies (40 vs. 32.6 percent). Notably, two investigations found identical admission rates for individuals diagnosed with UTI (59.3 vs. 58.3 percent). Kartal et al. (3) reported admitting five of fourteen (35.7 percent) patients with AGE. We admitted three out of eight (37.5%) individuals diagnosed with AGE. Kartal et al. (3) recommended that KT patients identified with AGE at the ED be hospitalized if they were dehydrated as a result of diarrhea or poor oral intake. In this way, our methodology was comparable to that of Kartal et al. (3). The closeness in admission rates for individuals with AGE across the two trials is most likely owing to the identical methodology.

Uysal et al. (6) reviewed the data of 41 patients who presented to ED. These authors denoted that the most common CC was fever (36.6%) and infectious diagnoses were more common than non-infectious ones (68 vs. 32%). Among the infectious diagnoses, AGE was the most common (26.8%) and it was followed by URTI (21.9%) and UTI (9.7%). On the other hand, AKI was the most frequent non-infectious diagnosis (9.7%). Our findings are similar to this study since fever was also the most frequent CC, infection was the most frequent diagnosis and AKI was the most common non-infectious diagnosis in our cohort. Uysal et al. (6) reported that they admitted 73.1% of their patients. This admission rate is significantly higher than our admission rate and those reported by other centers (3,7). However, these authors stated that their admission threshold was too low since they preferred to follow their KT patients as inpatients rather than outpatients following presentation to ED

(6). Uysal et al. (6) also reported that 2 (4.8%) patients presented with wrist fractures. In our cohort, 1 (2.3%) of our patients presented to ED with a wrist fracture. It is known that wrist fractures can be due to osteoporosis (9). All patients in our cohort, including this particular patient, were on an IS regime consisting of tacrolimus, mycophenolate mofetil, and prednisone. This patient was a postmenopausal woman who received a deceased donor KT in the first year of our KT program and experienced a low-trauma wrist fracture. Prednisone and tacrolimus can lead to bone loss averaging 1 to 2% per year after transplant. This patient was consulted with orthopedic surgery and received treatment for osteoporosis after fixation of the wrist fracture.

Uysal et al. (6) reported that 1 (2.4%) of their patients presented to ED with chest pain and were diagnosed with supraventricular tachycardia. In our cohort, 4 patients visited ED with the suspicion of an acute coronary syndrome. Two of these patients had dyspnea, 1 had a sore throat, and 1 had chest pain as the CC. Although none of these patients withouta history of CVD were diagnosed with myocardial infarction or cardiac arrhythmia in the ED setting, they were diagnosed with CVD after elective cardiac investigations (8.5%). The relatively higher diagnosis rate of CVD in our series (8.5 vs. 2.4%) can be due to the difference between the two patient groups regarding the primary diseases. The primary reason for ESRD was not analyzed in our cohort and also in the study of Uysal et al. (6). However, it is known that KT leads to a 5-fold increase in the risk of CVD (4).

To the best of our knowledge, this study is the first study analyzing the ED data of the KT patients transplanted in a newly established program. In line with this, patients were instructed to present to ED if they had unusual complaints out of work hours or in case of an emergency. Thus patients had a low threshold for presenting to ED.

CONCLUSION

After weighing our data, we believe that fever is the most often seen CC and infections, especially UTIs, are the most frequently encountered diagnosis in KT patients arriving to the ED. AKI is the most prevalent clinical condition among non-infectious diagnoses. Emergency doctors should keep in mind that KT patients may arrive to the ED with a number of symptoms, including dysuria and wrist discomfort, and may be diagnosed with a variety of conditions, including UTI and wrist fractures. Our study has some limitations which need to be considered while evaluating its findings. First, it is a retrospective study. Second, it has a relatively small sample size. Third, data regarding renal graft function at the time of ED presentation were not included in the analysis.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of the University of Health Science Dışkapı Yıldırım Beyazıt Training and Research Hospital Ethics Committee (Date: 14.06.2021, Decision No: 113-01).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

REFERENCES

1. Collins AJ, Foley RN, Herzog C, et al. Excerpts from the US Renal Data System 2009 Annual Data Report. Am J Kidney Dis 2010; 55: S1-420, A6-7.
2. Cimen SG, Oğuz E, Gundogmus AG, Cimen S, Sandikci F, Ayli MD. Listening to music during arteriovenous fistula surgery alleviates anxiety: A randomized single-blind clinical trial. World J Transplant 2020; 29: 79-89.
3. Kartal M GE, Eray O, Gungor F. Factors affecting to hospital admission for renal transplant patients in the emergency department. Turk J Emerg Med 2009; 9: 159–62.
4. Venkat KK, Venkat A. Care of the renal transplant recipient in the emergency department. Ann Emerg Med 2004; 44: 330-41.
5. Bardaxoglou E, Maddern G, Ruso L, et al. Gastrointestinal surgical emergencies following kidney transplantation. Transpl Int 1993; 6: 148-52.
6. Uysal E, Dokur M, Bakir H, Ikidag MA, Kirdak T, Kazimoglu H. the reasons of renal transplant recipients' admission to the emergency department; a case series study. Emerg (Tehran) 2016; 4: 207-10.
7. Tokalak I, Başaran O, Emiroğlu R, Karakayali H, Bilgin N, Haberal M. Problems in postoperative renal transplant recipients who present to the emergency unit: experience at one center. Transplant Proc 2004;36:184-6.
8. Trzeciak S, Sharer R, Piper D, et al. Infections and severe sepsis in solid-organ transplant patients admitted from a university-based ED. Am J Emerg Med 2004; 22: 530-3.
9. Heaf JG. Bone disease after renal transplantation. Transplantation. 2003; 75: 315-25.
10. Grimaldi A, Barletta A, Rascente M, et al. Infectious complications in the renal transplant recipient. Transplant Proc 2005; 37: 2502-3.
11. Koo EH, Jang HR, Lee JE, et al. The impact of early and late acute rejection on graft survival in renal transplantation. Kidney Res Clin Pract 2015; 34: 160-4.
12. Schmaldienst S, Dittrich E, Hörl WH. Urinary tract infections after renal transplantation. Curr Opin Urol 2002; 12: 125-30.
13. Becker S, Witzke O, Rübben H,et al. Harnwegsinfektionen nach Nierentransplantation: Essener Algorithmus zur kalkulierten Antibiotikatherapie [Urinary tract infections after kidney transplantation: Essen algorithm for calculated antibiotic treatment] Urologe A 2011; 50: 53-6.

14. Unterman S, Zimmerman M, Tyo C, et al. A descriptive analysis of 1251 solid organ transplant visits to the emergency department. West J Emerg Med 2009; 10: 48-54.
15. McElroy LM, Schmidt KA, Richards CT, et al. Early postoperative emergency department care of abdominal transplant recipients. Transplantation 2015; 99: 1652-7.
16. Schold JD, Elfadawy N, Buccini LD, et al. Emergency department visits after kidney transplantation. Clin J Am Soc Nephrol 2016; 11: 674-83.
17. Li AH, Lam NN, Naylor KL, et al. Early hospital readmissions after transplantation: burden, causes, and consequences. Transplantation 2016; 100: 713-8.
18. Okidi OO, Van Dellen D, Sobajo C, et al. Kidney transplant recipients requiring critical care admission within one year of transplant. Exp Clin Transplant 2017; 15: 40-6.
19. Weeda ER, Su Z, Taber DJ, et al. Hospital admissions and emergency department visits among kidney transplant recipients. Clin Transplant 2019; 33: e13522.
20. Lovasik BP, Zhang R, Hockenberry JM, et al. Emergency department use among kidney transplant recipients in the United States. Am J Transplant 2018; 18: 868-80.