Original article

Complications after a kidney transplant and impact on hospitalization time

Complicações após o transplante renal e a repercussão no tempo de internação

Amanda Maria Bezerra Rocha[1]
Maria Isabele Lopes Severiano de Sousa[2]
Lucas Mendes Feitosa Dias[3]
Rita Mônica Borges Studart[4]

[1]Hospital São José de Doenças Infecciosas (Fortaleza). Ceará, Brazil.
[2,4]Universidade de Fortaleza (Fortaleza). Ceará, Brazil.
[3]Corresponding contact. Universidade Federal do Ceará (Fortaleza). Ceará, Brazil. lucarmendi@ufpi.edu.br

ABSTRACT | OBJECTIVE: To evaluate post-kidney transplant complications and their repercussions on the duration of hospital stay. **METHODOLOGY:** This is a descriptive, documentary, retrospective and quantitative study, carried out in a public reference hospital. The sample consisted of 255 medical records of patients over 18 years of age who had undergone kidney transplantation for more than six months. Cases of double transplantation were excluded. **RESULTS:** Most patients were between 40 and 59 years old (42%), male (58.4%) and had a normal BMI (41.2%). Surgical complications, infections, and changes in graft function were significantly associated. The median hospital stay was 33 days for patients with surgical complications, compared to 10 days for the others (p<0.001). In cases of nonspecific infection, the median time was 25 days (p<0.001). The most prevalent infection was urinary tract, with a median length of hospital stay of 31 days. Patients with immediate graft function had a median hospital stay of 7 days; slow function, 10 days; late function, 20 days; and graft loss, 35 days. **CONCLUSIONS:** After the evaluation of complications after kidney transplantation, a significant association was observed with the length of hospital stay, the presence of UTI had a negative impact on the prognosis and the evolution of postoperative recovery.

KEYWORDS: Nursing. Patient Discharge. Kidney Transplantation.

RESUMO | OBJETIVO: Avaliar as complicações pós-transplante renal e sua repercussão na duração da internação hospitalar. **METODOLOGIA:** Trata-se de um estudo descritivo, documental, retrospectivo e quantitativo, realizado em um hospital público de referência. A amostra foi composta por 255 prontuários de pacientes com mais de 18 anos e transplante renal há mais de seis meses. Foram excluídos casos de transplante duplo. **RESULTADOS:** A maioria dos pacientes tinha entre 40 e 59 anos (42%), era do sexo masculino (58,4%) e possuía IMC normal (41,2%). Complicações cirúrgicas, infecções e alterações na função do enxerto apresentaram associação significativa. A mediana de internação foi de 33 dias para pacientes com complicações cirúrgicas, contra 10 dias para os demais (p<0,001). Em casos de infecção inespecífica, o tempo mediano foi de 25 dias (p<0,001). A infecção mais prevalente foi do trato urinário, a mediana do tempo de hospitalização foi de 31 dias. Pacientes com função imediata do enxerto tiveram mediana de internação de 7 dias; função lenta, 10 dias; função tardia, 20 dias; e perda do enxerto, 35 dias. **CONCLUSÕES:** Após a avaliação das complicações após o transplante renal foi observado associação significativa com o tempo de hospitalização, a presença de ITU gerou impacto negativo no prognóstico e na evolução da recuperação pós-operatória.

PALAVRAS-CHAVE: Enfermagem. Alta do Paciente. Transplante Renal.

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1. Introduction

Kidney transplantation is a successful strategy for the treatment of chronic kidney disease (CKD), enabling increased survival and improved quality of life[1]. It is a complex surgical procedure that has peculiarities that involve ethical, clinical and immunological aspects added to specific conditions between donor and recipient[2].

In Brazil, 4,828 interventions of this type were registered in 2021, the country ranks third in the world ranking of kidney transplants, and the rate of positive results is also not small, since transplant survival in less than a year exceeds 95% in reference hospitals for the procedure. In Brazilian hospitals, it is observed that infectious complications, especially urinary complications, are the main causes of prolonged hospital stay[3].

Pharmacological treatment, with the association of immunosuppressants and other care for the maintenance of the renal graft, requires from the patient dedication, understanding and ability to administer them[4]. Immunosuppressants as part of the therapeutic regimen have a narrow safety margin where the dose for maintenance leads the patient to a chronic state of immunosuppression, making them susceptible to the emergence of clinical or surgical complications[5].

Immunosuppressants exert a great influence on the occurrence of opportunistic infections in transplant recipients, even after the advances obtained in the surgical technique of transplants[6]. To avoid transplant failure, measures to identify complications early are required, and knowing the most common complications is an alternative to avoid graft loss and reduce early mortality[7].

The use of immunosuppressive therapies results in an increased risk of developing infections, which is determined by several factors, including the nature and intensity of epidemiological exposure, degree of immunosuppression, and preventive measures used[8]. In the first months after surgery, the most common pathogen is bacterial, with the urogenital tract being the site of infection with the highest risk of complications, followed by viral infections by cytomegalovirus and Epstein-Barr[9].

In this context, rejection, infection, and graft-related problems are types of postoperative complications that may be related to the role of recipients, environmental aspects, care work, and surgical procedures[10]. Another relevant complication is urinary tract infection (UTI), since it affects more than one third of transplant patients and leads to increased morbidity and mortality. In addition, the length of hospital stays gains relevance in this hospital context, as it is proportional to complications[11].

Considering that post-kidney transplant infections are important complications that can lead to graft loss, it is necessary to verify the occurrence of processes that trigger the various complications in the postoperative period. Through the identification of etiological agents, sites of infection and characteristics of patients/donors, it is possible to understand the origin of such complication in order to change the panorama found today[12].

Inserted in the context of kidney transplantation, it was possible to verify the need for frequent monitoring to promote the restoration of the patient's health, a factor that raised the interest in studying the subject, considering the variation in the length of hospital stay related to various reasons. The nurse's performance in this complex scenario should be focused on the evaluation, detection and early intervention in possible post-transplant complications, thus promoting care to mitigate damage. Therefore, the study aimed to evaluate complications after kidney transplantation and the association with length of hospital stay.

2. Methodology

This is a descriptive, documental and retrospective study, with a quantitative approach. The main purpose of the descriptive study is to describe the characteristics of a specific population using standardized data collection methods[13].

The research was carried out in a transplant unit of a tertiary level public General Hospital, located in Fortaleza, Ceará. The sample consisted of the medical records of kidney transplant patients in the year of 2022. Data from patients over 18 years of age and with a transplant time of more than six months were included. Data on double kidney/pancreas or kidney/liver transplantation were excluded.

The study used sociodemographic, clinical, and kidney transplant-related variables. Among the sociodemographic variables, the following stand out: age group, biological sex, body mass index (BMI), skin color, education, marital status, and place of residence. Clinical variables included: diagnosis of primary renal disease (such as diabetic nephropathy, hypertensive nephropathy, or glomerulopathies), type and duration of renal replacement therapy (haemodialysis or pre-emptive transplantation), and recipient sensitization. The variables related to transplantation included the occurrence of surgical complications, infections (such as UTI, surgical wound infection, and nonspecific infection), and the type of graft function (immediate, slow, delayed, or loss). The main dependent variable was length of hospital stay (in days), analyzed using measures of central tendency and appropriate statistical tests for nonparametric data.

To calculate the sample, a confidence interval of 95%, a sampling error of 5%, P (level of approval) and Q (level of failure) of 50% were used, a sample calculation for a finite population with non-probabilistic sampling, since criteria established for convenience by the researcher according to the objectives of the study were used. The total sample consisted of 255 medical records.

The data were organized in an Excel spreadsheet and exported to the Statistical Package for the Social Sciences (SPSS) software, version 23.0, for descriptive and inferential analysis. Categorical variables were expressed as absolute (n) and relative (percentage) frequencies. Quantitative variables were measures of central tendency (minimum and maximum values, mean, median, percentiles) and dispersion (standard deviation). Analyses were performed based on secondary data (medical records), and primary data were obtained, which were collected in the development of the study, according to the descriptive epidemiology. Continuous variables were presented as median and categorical variables were presented as frequency and percentage.

To analyze the association between post-transplant complications and graft functions and length of hospital stay (the data showed a non-parametric distribution), the Mann-Whitney test and the Kruskal Wallis test were calculated for the comparison of groups, and the value of $p \leq 0.05$ was considered statistically significant. The research met the fundamental ethical and scientific requirements of Resolution 466/12 of the National Health Council and was approved under the number of opinion 5.070.891 and CAAE: 46569921.7.0000.5040.

3. Results

Data were collected from 255 patients, with a predominance of the age group between 40 and 59 years (42%), male (58.4%), normal BMI (41.2%), married (52.5%), brown (85.0%), from the interior of the state (47.4%) and with high school education (41.5%).

Table 1. Sociodemographic characteristics of kidney transplant recipients. Fortaleza, CE. 2023

Characteristics	n	%
Age group (in years)	**255**	
18 to 39	97	38.0
40 to 59	107	42
≥ 60	51	20
Biological sex	**255**	
Male	149	58.4
Female	106	41.5
BMI weight classification*	**255**	
Low weight (BMI < 18.5 Kg/m²)	31	12
Normal (BMI between 18.5 and 24.9 Kg/m²)	105	41.2
Overweight (BMI between 25.0 and 29.9 Kg/m²)	79	31
Obese (BMI ≥ 30.0 Kg/m²)	35	14
No information	5	2
Skin color	**255**	
White	16	6.2
Brown	217	85
Black	22	9
Schooling	**255**	
Illiterate	14	5.4
Literate	2	1
Elementary school	94	37
High school	106	41.5
Higher education	31	12.1
Do not study	8	3.1
Marital status	**255**	
Single	99	39
Married	134	52.5
Common-law marriage	4	1.5
Divorced	12	5
Widower	6	2.3
Place of residence	**255**	
Fortaleza	99	39
Interior of the state	121	47.4
Other state	35	14

Source: the authors (2023).

Regarding primary kidney disease, it was observed that 38% had no defined diagnosis. Regarding diabetes mellitus, 16.4% had this condition and 18% lost renal function due to chronic glomerulopathies. Regarding the type of renal replacement therapy, haemodialysis predominated with 93% of the cases. Regarding dialysis time, there was a predominance of time longer than 36 months with 43% and only 3.2% transplanted without undergoing dialysis. It was observed that 90% of the patients were not hypersensitized (Table 2).

Table 2. Clinical characteristics of kidney transplant recipients. Fortaleza, CE. 2023

Variables	n	%
Diagnosis of primary kidney disease	**255**	
Diabetic nephropathy	42	16.4
Hypertensive Nephropathy	27	10.5
Chronic glomerulopathies	46	18
Polycystic kidney disease	18	7
Urologic pathologies - Neurogenic bladder	13	5
Etiology unknown	97	38
Other	12	5
Type of renal treatment	**255**	
Haemodialysis	237	93
Peritoneal dialysis	0	0
Pre-emptive	18	7
Dialysis time (months)	**255**	
Pre-emptive transplantation	18	7
< 12	25	10
12 to 36	98	38.4
> 36	109	43
No information	5	2
Hypersensitized receptor	**255**	
Yes	25	10

Source: the authors (2023).

Table 3 shows the association between post-transplant complications and renal graft function and length of hospital stay. The occurrence of surgical complications, infections, and graft function were associated with length of hospital stay. The median length of hospital stay was 33 days for those who had any surgical complication and 10 days for those who did not ($p<0.001$). For patients who had nonspecific infection in the postoperative period, the median length of hospital stay was 25 days, while for the others it was only 10 days ($p<0.001$).

Regarding urinary tract infection (UTI), the median length of hospitalization was 31 days, while patients who did not have UTI had a hospital stay of nine days. Surgical wound infection increased this number to 41 days of hospital stay and 10 days for those who did not have infection at this site (Table 3). In patients with immediate graft function, the median length of hospital stay was seven days, while for those with slow graft function it was 10 days, with late function it was 20 days and in graft loss it was 35 days.

Table 3. Analysis of the association of post-transplant complications and graft function with length of hospital stay. Fortaleza, CE. 2023

Variables	n	%	Median-hospital time-(Days)	1st Quartile	3rd Quartile	p-value
Complications						
Surgical complications	22	8.6	33.5	17	64	**<0.001[1]**
Nonspecific Infection	68	26.6	25.5	16	42	**<0.001[1]**
Urinary tract infection	31	12.2	31	20	63	**<0.001[1]**
Surgical wound infection	15	5.9	41	31	64	**<0.001[1]**
Infection at other sites	18	7.1	17.5	9	28	**0.015[1]**
Graft function						
Immediate Graft Function	134	52.5	7	6	11	**<0.001[2]**
Late Graft Function	54	21.2	20	12	35.5	
Slow Graft Function	63	24.7	10	8	17	
Graft loss	4	1.6	35.5	6	101.5	

Source: the authors (2023).
[1]Mann-Whitney test; [2]Kruskal-Wallis test.

4. Discussion

The clinical profile of the patients who underwent kidney transplantation in this study converged with that of other studies already conducted on the subject, such as the one carried out in the South, Southeast and Northeast regions of Brazil, where they found that most renal transplant patients were over 40 years old (mean of 45.4 years), with a predominance of males and married[14], corroborating the findings of the present study. This reality reflects part of the challenges faced in the Brazilian reality regarding access, graft maintenance, and health education in the post-transplant period.

Although the BMI found in this study is mostly within normal limits, the effect of weight gain in renal transplant patients is a frequent finding, becoming a risk factor for systemic arterial hypertension, coronary heart disease, changes in serum lipids and the development of post-transplant diabetes. Excess weight, together with glycemic changes, can reduce the effectiveness of the transplanted organ and reduce its survival[15].

The low level of education of patients, in general, makes it difficult to understand, which can compromise treatment adherence[16]. It is also important to highlight that low education and inequalities in access to information are determining factors when it comes to people with chronic non-communicable diseases.

Marital status can significantly affect continuity and adherence to treatment, although the influence of the existence of a marital partner is not conclusive in some publications. Other studies showed greater adherence among married (94.8%) than among single (80.4%) or divorced (64.3%) individuals, the fact of being separated or divorced was a factor associated with non-adherence to treatment[17].

Regarding the place of residence of the patients, in this study, the prevalence of patients from the interior of the state was verified, a result that differs from the study carried out in Manaus, which showed that only 13.1% of patients with CKD are residents in the interior[18]. It is noteworthy that studies comparing this prevalence between city and country of people undergoing kidney transplantation are scarce.

The primary disease that most led patients to chronic kidney disease was of unknown etiology, followed by glomerulopathies, DM, and SAH, respectively. This is in line with Sugünes et al.[19] in which DM, SAH and glomerulopathies were also the main causes of kidney injury that led the patient to transplantation.

In the sample studied, most patients spent a long period on dialysis, more than 36 months, which corroborates the study by Santos et al.[20], in which the time on dialysis before kidney transplantation was more than 60 months. In the study by Fu et al.[21], With 4,440 kidney transplant recipients, the relative risk of all-cause complications associated with dialysis time was 42% over one to three years, with this risk increasing by 5% for each additional year on dialysis. According to data from the Brazilian Dialysis Survey for the year 2021[22] the prevalence of male dialysis patients is 58%, a study carried out in Santa Catarina identified that 68.9% were male[23].

Infections resulting from the surgical process that extends the period of stay in the hospital are more related to microorganisms in the hospital's own microbiota, which usually invade the patient's body through invasive devices to which they are submitted. Delayed graft function, characterized by the need for dialysis in the first week after transplantation, is a relevant aspect that contributes to the development of infections, as it is related to a very common complication in patients who received grafts from deceased donors[24], In addition, the literature also shows that hematomas, lymphoceles and urethral stenosis continue to be significant events after kidney transplantation, having a direct association with the length of hospital stay[25].

Delayed graft function is also associated with a higher risk of acute rejection, since there is an increase in the immunogenicity of the allograft induced by ischemia and reperfusion injury, which increases the release of inflammatory cytokines. In addition, the delay in the recovery of graft function increases the length of hospital stay, which also contributes to the occurrence of infection, culminating in worse long-term graft survival[26].

UTI is the most common infection among kidney recipients and is associated with increased morbidity and mortality in these patients and can occur at any time, but its highest incidence is observed in the first year, more specifically in the first three months after transplantation[2]. The occurrence of UTI determines the prognosis and evolution of postoperative recovery, because although its impact on graft survival is not completely elucidated, it is the most common cause of sepsis in kidney transplant recipients[11].

One of the main difficulties found in this study was the lack of complete data in the medical records, which hindered the analysis of some important variables. This restriction is frequent in retrospective studies that use secondary records, as the quality of the information is directly related to the organization and accuracy of the clinical records. In addition, the research was conducted in only one referral hospital, which restricts the application of the results to other contexts, whether regional or national. The lack of complete clinical data has precluded the analysis of possible additional relationships between certain complications and length of hospital stay.

5. Conclusion

After the evaluation of complications after kidney transplantation, a significant association was observed with the length of hospitalization. In patients with immediate graft function, the median length of hospital stay was seven days, while for those with slow graft function it was 10 days, with late function it was 20 days and in graft loss it was 35 days.

The sociodemographic and clinical profile of kidney transplant patients was characterized by a predominance of male, married, brown patients, from the interior of the state and with high school education. The undetermined cause of primary renal disease and, therefore, without a defined diagnosis was present in large proportion. UTI was the most prevalent infection in renal transplant patients, with a negative impact on the prognosis and evolution of postoperative recovery, with an increase in the number of days of hospital stay.

Authors' contributions

The authors stated that they made substantial contributions to the work in terms of research design or design; data acquisition, analysis or interpretation for the work; and writing or critical review of relevant intellectual content. All authors approved the final version to be published and agreed to take public responsibility for all aspects of the study.

Competing interests

No financial, legal, or political conflicts involving third parties (government, private companies and foundations, etc.) have been declared for any aspect of the submitted work (including but not limited to grants and funding, advisory board membership, study design, manuscript preparation, statistical analysis, etc.).

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