ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 49. 23
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 3, Issue – 5, October - 2018, Page No. : 111 - 117

Hospitalisation after Renal Transplantation: A Single Centre Cross-Sectional Study

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Statement: It is stated that manuscript is read and approved by all author/s, that requirements for authorship, as stated earlier has been met ,that the author/s believe that the manuscript represent honest work.

Abstract

Background: Unplanned hospital readmissions following index medical and/or surgical events are common and costly. Readmission adds to patient burden and puts patients at increased risk of transition-of-care errors, such as medication regimen errors. Reducing readmissions through specific interventions has the potential to both lower the cost associated with readmissions and improve clinical outcomes.

Aim of the study: Despite the comprehensive studies evaluating hospital readmissions, there is a paucity of data evaluating hospital readmissions after kidney transplantation. Thus we had conducted this study with the aim of this study is to investigate the cause of hospital readmission following kidney-only transplantation.

Materials and methods: This is a retrospective single centre observational study that included all kidney-only transplant recipients, admitted at department of Nephrology, Gauhati medical college and hospital (GMCH), Assam, India, from April 2011 to March 2016, irrespective of the centre of transplant. Demographic and baseline characteristics of the study population were taken from the medical record database. The cause of hospital readmissions were grouped into following categories: infectious events, surgical issues, drug complication, cardio-vascular events, graft injury (acute rejection/chronic allograft injury/graft failure), complication of Diabetes Mellitus, recurrent disease, haematological events, New onset diabetes after transplant (NODAT), others.

Results: During the study period, 142 kidney transplant patients met the criteria to be included in the analyses. Out of 142, 115 patients were admitted once and 27 patients were admitted more than once. Most common cause of admission was infections seen in 47.9% cases. Those who are admitted more than once are younger (p < 0.001), had fewer co-morbid condition (p & lt; 0.001), less

frequently diabetic (p < 0.001) and had shorter initial hospital stay (during transplant) (p < 0.001).

Conclusion: According to our study infections are most common cause of hospital readmission post-transplant, and factors associated with repeated admissions post renal transplant includes older age, multiple co-morbidities, diabetes, longer dialysis vintage years and prolonged initial hospital stay.

Key words: Banff classification, IgA nephropathy, Renal transplant, Allograft, Dialysis.

Introduction

Unplanned hospital readmissions following index medical and/or surgical events are common and costly. [1] Rates of hospital readmissions have increased over the past two decades beyond what is accounted for by growth of the general population. [2] Readmission adds to patient burden and puts patients at increased risk of transition-of-care errors, such as medication regimen errors. [3] Reducing readmissions through specific interventions has the potential to both lower the cost associated with readmissions and improve clinical outcomes. [4] The need of hospital readmissions after kidney transplantation is likely multifactorial.

Demographic factors, pre-existent medical and psychological co-morbidities, and pre-transplant physical conditioning may each interfere with the recovery process post- transplantation and may result in the need for early readmission. [5]As the transplant recipient population grows and lives longer, emergency physicians are increasingly faced with caring for these complex patients with acute and chronic medical and surgical conditions. Despite the comprehensive studies evaluating hospital readmissions, there is a paucity of data evaluating hospital readmissions after kidney transplantation. Thus we conducted a single-centre retrospective study to investigate the cause of hospital readmission following kidney-only transplantation.

Materials and Methods

This is a retrospective single centre observational study that included all kidney-only transplant recipients, admitted at department of Nephrology, Gauhati medical college and hospital (GMCH), Assam, India, from April 2011 to March 2016, irrespective of the centre of transplant. This study was conducted to study the cause and clinical predictors of unplanned readmissions following kidney-only transplant surgery. Demographic and baseline characteristics of the study population were taken from the medical record database. The cause of hospital readmissions were grouped into following categories: infectious events, surgical issues, drug complication, cardio-vascular events, graft injury (acute rejection/chronic allograft injury/graft failure), complication of Diabetes Mellitus (DM), recurrent disease, haematological events, New onset diabetes after transplant (NODAT), others.

The occurrence of graft dysfunction was documented through clinically indicated biopsy according to Banff classification.

Inclusion Criteria

- All first time, kidney-only transplant recipient, who are admitted at our centre during the study period (irrespective of centre of transplant).

Exclusion Criteria

- Patient who lost the graft during the initial hospital stay or who experience primary non-functioning of the graft.
- Second kidney transplant.
- Simultaneous multi-organ transplant.

Statistical Analysis

To calculate statistical data we used mean, standard deviation, percentage and p-value. SSPS was used to calculate the statistical data like p value.

Results

During the study period, 142 kidney transplant patients met the criteria to be included in the analyses. Mean age of the study population was 39.9 ± 12.4 years old. One hundred and thirty-three (i.e. 94%) subjects were male (Table 1).

Table 1: Mean age and sex distribution

Patient characteristics	N=142
Age (years) mean ± SD	39.9 ± 12.4
Sex (%) men	93.7

Majority of patients were in age group of 30-44 years (> 40% patients), and there were only 6 patients in age group of ≥ 60 years (Table 2).

Table 2: Distribution of patients according to the age.

Age, years	Number	Percentage
18-29	31	21.33%
30-44	58	40.84%
45-59	47	33.09%
≥ 60	6	4.22%

Most common co-morbid condition that was seen in 78% patients was hypertension, followed by diabetes mellitus, seen in 23% of patients. Other co-morbid conditions include CAD, CHF, hypothyroidism and chronic hepatitis-C. More than one co-morbid condition was seen in 22.5% of cases (Table 3).

Table 3: Frequency of different comorbid condition

Co-morbid condition	Number	Percentage (%)
Diabetes mellitus	33	23.24
Hypertension	111	78.16
Congestive heart failure	8	5.63
Hypothyroidism	12	7.04
CAD	10	8.45
Positive HCV status	5	3.52

81% of patients were re-admitted within one year of kidney transplantation, out of which 39% were admitted within one month of transplantation. Only 19% of admitted patients had their transplant >1 year back (Table 4). 48.5% of patients were admitted for more than 2 weeks duration, while only 13% of patients were admitted for less than one week (Table 5).

Table 4: Number of admissions with respect to duration after transplant

Duration after transplantation	Number	Percentage (%)
< 1month	66	39.05
>1month -1year	71	42.01
>1year – 5 years	32	18.94

Table 5: Number of admissions with respect to duration of hospital stay

Length of hospital stay	Number	Percentage (%)
< 1 week	22	13.01
1week to 2 weeks	65	38.46
>2 weeks	82	48.52

Infections were the most common reason for unplanned hospital readmission, accounting for 47.9% of hospital readmission. The source of infection was gastro-intestinal, followed by urinary tract and respiratory tract in almost equal number of cases (24.6%, 22.2% and 21% respectively). 17% cases presents with frank sepsis and six patients each presented tuberculosis and muco-cutaneous involvement (Table 6 and 7).

Table 6: Distribution of patients as per cause

Diagnosis	Number	Percentage (%)
Infection	81	47.9
Surgical	8	4.7
GI issues	17	10
Cardio-pulmonary	9	5.3
AR/CAI/graft injury	25	14.7
DM complication	4	2.4
Recurrent disease	6	3.5
Hematological	6	3.5
NODAT	11	6.5
Others (AVN/Lymphoma)	2	1.2

Table 7: Frequency of different infections

Source of infection	No. (n=81)	Percentage (%)
Respiratory Tract Infection	17	20.98
Urinary Tract Infection	18	22.22
Gastro-Intestinal	20	24.69
Sepsis	14	17.28
Tuberculosis	6	7.40
Muco-cutaneous	6	7.40

14.7% cases were admitted with graft dysfunction. 10% cases were admitted because of adverse drug reaction which include drug induced loose stools and hepatitis. 11 patients were admitted with NODAT. 8 patients were admitted with surgical complications, which include peri-nephric collection, urinary retention and RAS. 9 patients were admitted with cardio- vascular events. 6 patients each were admitted with recurrent disease (IgA Nephropathy and Memberanoproliferative Glomerulonephritis) and haematological events, which include anaemia and leukopenia. 4 patients were admitted with complication of DM, which includes diabetic neuropathy and gastropathy. One patient each was admitted with avascular necrosis of hip and lymphoma (Table 8).

Table 8: Comparison of characteristics of patients who were admitted twice as compared to those who were admitted once.

Characteristics	Admitted Once (n=115)	Admitted Twice (n=27)	p value
Mean age (years)	36.67 years	53.4years	< 0.001
≥ 2 Co-morbid condition (%)	11.30%	70.4%	< 0.001
DM	9.56%	77.78%	< 0.001
Induction	20.86% (24)	22.2% (6)	0.95
Dialysis vintage (years)	2.6 (±1.5)	3.5 (±1.6)	< 0.001
Initial hospital stay	12 (±3)	15 (±2)	< 0.001
Delayed graft function	5.21% (6)	11.11% (3)	0.25
Baseline Serum creatinine	1.39 (±0.41)	1.64 (±0.8)	0.31

When we compared the characteristics of patients who were admitted once with those who are admitted twice during the study period, we found that difference in mean age group was 16.73 years. Those admitted twice were more likely to be diabetic and also more chances of having 2 or more co-morbid condition (Table 9). Also those admitted once were on hemo-dialysis for shorter duration (2.6 years).

Table 9: Comparison of cause of admission as per duration after transplant

Cause	< 1 month	1-12 months	1-5years
Infection	35	31	15
Surgical issues	8	0	0
GI issues	8	9	0
Cardio-vascular events	5	2	2
Graft injury	3	16	6
Complication of DM	4	-	-
Recurrent diseases	0	3	3
Hematological events	4	2	0
NODAT	0	6	5
Others	0	1	1

Discussion

This retrospective cross-sectional study conducted over 5 years form, April 2011 to March 2016 had demonstrated

significantly high hospitalisation rate, with wide variety of presenting symptoms and diagnoses. During the study period 142 patients had a total of 169 admissions, among them 115 patients were admitted once and 27 patients were admitted twice. Mean age of the study population was 39.9 (±12.4 years) years old. Almost 2/3 rd (73%) of study population belong to age group of 30-59 years and only 4% patients are above the age of 60 years. Majority of patients were male and only 6% of study population was female. According to a study by Luan FL, [6] mean age of the study population was 49.3 (±13.3 years). The most common diagnoses for unplanned hospital readmissions in our study was infections (fig-1), which accounts for 37.9% of all readmissions. Infections remain the most common cause of readmission in most of the studies. In studies by Uysal E., [7] Tokalak, [8] and George Sterbach [9] fever was most common presentation (36%, 26%, and 37% respectively). The source of infection most commonly was gastro-intestinal, followed by urinary tract and respiratory tract in almost equal number of cases (24.7, 22% and 21% respectively). Most common presenting infection varies in different areas as reflected in different studies, like AGE (27%) in study by Uysal E., [7] URTI (43%) in study by Tokalak, [8] and UTI (42%) in study by Maria Del. [10] Climatic difference may have a role in predisposition of different infection.

Infections (UTI 40%) were most common cause of death in study by Reiss MA. [11] 17% cases presents with frank sepsis and four patients presented with tuberculosis (2 pulmonary TB, 3 TB pleural effusion and 1 spinal TB) and muco-cutaneous involvement (2 cases of zoster and 4 oesophageal candidiasis).

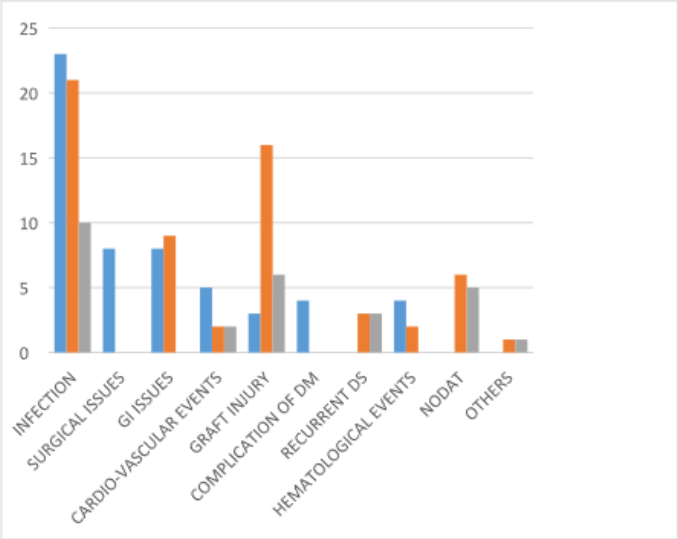

Figure 1: Comparison of cause of admission as per duration after transplant

In our study 15% cases were admitted with graft dysfunction, among which 10 cases were biopsy proven acute rejection and other 15 were chronic allograft injury. 10% cases were admitted because of non-infectious gastro-intestinal events (drug induced), which include, 7cases of acute gastritis (among which 2 had UGI bleed), 6 patients had loose stools and 4 cases had asymptomatic elevation of liver enzymes. 11 patients were admitted with NODAT. 8 patients were admitted with surgical complications, which include peri-nephric collection, urinary retention and RAS. Surgical issues were main cause of hospital readmission during first month after transplantation. 9 patients were admitted with cardio-vascular events, among which 6 due to uncontrolled hypertension and 3 cases due to CAD. 6 patients each were admitted with recurrent disease (4 cases had IgAN and 2 cases had MPGN) and haematological events, which include 2 cases of anaemia and 4 of leukopenia. 4 patients were admitted with complication of DM, which includes diabetic neuropathy and gastropathy, 2 cases each. One patient each was admitted with avascular necrosis of hip and lymphoma. When we compared the characteristics of patients who were admitted once with those who are

admitted twice during the study period, we found that those patients who were admitted twice were aged and difference in mean age group was 16.73 years (p < 0.001). Those admitted twice were more likely to be diabetic (p < 0.001) and also more chances of having 2 or more co-morbid condition (p < 0.001). Thus in this study we found that elderly patient with increasing number of co-morbid conditions had higher chances of getting readmitted post transplant. In the study by Maria Del, age is the most important factor associated with repeated admission. Also we found that those admitted once were on haemodialysis for shorter period of time prior to renal transplant as compared to those who were twice (p < 0.001). Also those admitted once, had shorter initial hospital stay (at the time of transplantation) (p < 0.001).in study by Mc Elroy longer initial hospital stay was associated with early hospital readmission and poor graft survival. [12] In this study we didn't found any relation of induction with readmission. Although delayed graft function was seen in lower percentage of patients who were admitted once also baseline serum creatinine was lower in patients who were admitted once, but in our study we didn't found these factors to be associated multiple hospital readmissions. Most common co-morbid condition that was seen in 78% patients was hypertension, followed by diabetes mellitus, seen in 23% of patients. Other co-morbid conditions include CAD, CHF, hypothyroidism and chronic hepatitis-C. More than one co-morbid condition was seen in 22.5% of cases. According to the study by Rigattoc etal [13] CVD (Cardiomyopathy and IHD) was seen in up-to 50% cases, while CVD was seen in 60% cases in study by Maria Del. [10] 48.5% of patients were admitted for more than 2 weeks duration, while only 13% of patients were admitted for less than one week. 81% of patients were re-admitted within one year of kidney transplantation, out of which 39% were admitted within one month of transplantation. Only 19% of admitted patients had their transplant >1 year back. Thus in this study we found that readmissions rate are high during the first year post renal transplant, and that too especially during the first month post transplant, and it decreases after one year. In various studies it has been seen that in first year post transplant readmission rates are highest.

Limitations

There are few limitations in this study, as this is a retrospective study, and retrospective study has its own set of limitations, also this is a small study and a large study with higher number of study population can give better information about the causes of early and repeated hospitalisation. Also in this study we had not seen the impact of transplant factors (donor's characteristics, ischemia time, percentage HLA mismatch etc) on hospital readmission after transplant.

Conclusion

Hospital readmissions after renal transplantation is not uncommon and with better knowledge of causes and risk factors, repeated hospital readmissions can be prevented, thus improving long term outcome of renal transplant.

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