

Acute Coronary Syndrome in Renal Transplant Recipients, A Retrospective Study

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ABSTRACT

Background: Acute coronary syndrome (ACS) is associated with instant decreased flow of blood to heart causing cardiac arrest in some cases. In renal transplant recipients it is one of the major reasons for complications and death.

Objectives: To determine the frequency of ACS in Renal Transplant Recipients (RTR).

Methodology: This retrospective study was carried out at a public kidney center in which data of patients was included from 2017 to 2022. This included previously recorded data of 450 renal transplant recipients (RTR) from a public hospital over a period of five years. Patients between 15-70 years of age of either gender admitted for renal transplant patient were included in the study. Patients with pre-existing acute coronary syndrome or with incomplete data were excluded from the study. SPSS version 23.0 was used for data analysis. For qualitative variables, mean and standard deviation were reported while for quantitative variables, frequency and percentages were reported.

Results: The findings showed that RTR were predominantly male 342(76%) versus female 108(24%) from total of 450. Age wise middle aged patients were high in number 142 (31.56%). Acute Coronary Syndrome was reported in 15 (3.33%) patients. Death occurred in 09 (1.86%) RTR patients of ACS. Readmission for up to 30 days were 83 (18.44%) patients, out of which 4 (4.82%) were for ACS, 3 (75%) for NSTEMI and 1 (25%) for STEMI.

Conclusion: Based on this research findings it is concluded that ACS in RTR is worth considering a problem.

Keywords: Acute Coronary Syndrome, Renal Transplant Recipients, Renal Transplantation, Cardiovascular Event

INTRODUCTION

Adverse cardiovascular event is known to be a leading cause of mortality among renal transplant recipients (RTR) among which Acute Coronary Syndrome (ACS) is the most common cardiovascular event. However, in RTR, dialysis is more closely associated with higher prevalence of cardiovascular disease as compared to renal transplantation. Indeed, renal transplantation play a significant role in decreasing incidence of fatal and nonfatal coronary syndrome events.¹ Nevertheless, these events are dissatisfactorily defined after the course of renal transplantation in various recipients. Certain uremia related risk factors have decreased but other factors like diabetes, hyperlipidemia and hypertension are dramatically regressed. Renal transplant recipients possess long term historic background of kidney diseases, rejection episodes and dialysis in addition to pretransplant cardiovascular disease.²

Incidence of Acute Coronary Syndrome After Kidney Transplantation

According to various studies, renal dysfunction and heart diseases like acute coronary syndrome (ACS) structure a high-risk aggregate. Patients suffering from mild renal inadequacy usually experience more than twofold greater mortality rates after the course of acute coronary syndrome as compared to individuals with normal kidney function. Death rate after acute coronary syndrome accelerates dramatically among patients of end-stage renal disease on dialysis.³ Nevertheless, renal transplantation decreases risk assessment for myocardial infarction and consequently improves survival after it. But death rate usually remains severe after medication for acute coronary syndromes specifically among kidney allograft recipients. Approximately, it ranges from 24% (1 yr) to 38% (2 yr) to 45% (5 yr).⁴ In addition to being foremost factor for mortality in renal transplant recipients, post transplantation acute coronary syndrome has significant connotation for allograft durability in the population. Several observations have certainly analysed prevalence of acute coronary syndrome after renal transplantation on the basis of discharge diagnosis by a particular primary hospital. But these findings are not complete due to limited information related to different clinical variables and availability of various resources. Furthermore, other

aspects like underlying risk, fatal myocardial infarction and secondary diagnosis are not considered and confirmed.⁵

Risk Factors

Risk factors for renal transplant recipients after suffering from acute coronary syndrome includes kidney donor, peculiarity of recipient, transplantation management, transplant method and duration.⁶ Beyond the facts, renal transplant recipients possess high-rate risk factors associated with Framingham atherosclerotic vascular disease such as dyslipidemia, advanced age, hypertension and diabetes. Other mediators of acute coronary syndrome risk include duration of dialysis before the course of renal transplantation, immunosuppressive regimen, history of hypertension in donor, posttransplantation diabetes quality of transplant function.^{7,8}

In addition to ambiguity regarding magnitude of prevalence rate, post transplantation myocardial infarction, ability to access risk proficiently, spectrum of outcomes after medical complication and the independent expected values for post transplantation acute coronary syndrome analysis are still unknown and require comprehensive research.^{9,10} However, limited evidence is available in terms of renal transplant recipients inUSRDS, also known as the United States Renal Data System.¹¹ This retrospective study is aimed to evaluate frequency of acute coronary syndrome in kidney transplant recipients and determine influence of complication after transplantation including graft and life loss.

METHODOLOGY

This retrospective study was carried out at a public kidney center in which data of patients was included from 2017 to 2022. This included previously recorded data of 450 renal transplant recipients (RTR) from a public hospital over a period of five years. Patients between 15-70 years of age of either gender admitted for renal transplant patient were included in the study. Patients with pre-existing acute coronary syndrome or with incomplete data were excluded from the study. Baseline variables include age and distribution of age, gender distribution, frequency of ACS in RTR patients and mortality. SPSS version 23.0 was used for data analysis. For qualitative variables, mean and standard deviation

were reported while for quantitative variables, frequency and percentages were reported.

RESULTS

There were a total of 450 renal transplant recipients (RTR) in the nephrology and renal diseases (NRD) section, out of which 342 (76%) were male and 108 (24%) were female [Figure I]. Age wise 9 (2%) were less than 20 years, 27 (6%) were 20-29 years, 111 (24.67%) were 30-39 years, 142 (31.56%) were 40-49 years, 87 (19.33%) were 50-59 years and 74 (16.44%) 60 years and above [Figure II].

A total of 15 (3.33%) patients had Acute Coronary Syndrome (ACS) of which 3 (20%) patients had STEMI while 12 (80%) had NSTEMI. A total of 9 (1.86%) RTR patients died of which 1 (11.11%) had STEMI and 8 (88.89%) NSTEMI. Readmission for up to 30 days were 83 (18.44%) patients, out of which 4 (4.82%) were for ACS 3 (75%) for NSTEMI and 1 (25%) for STEMI [Table I].

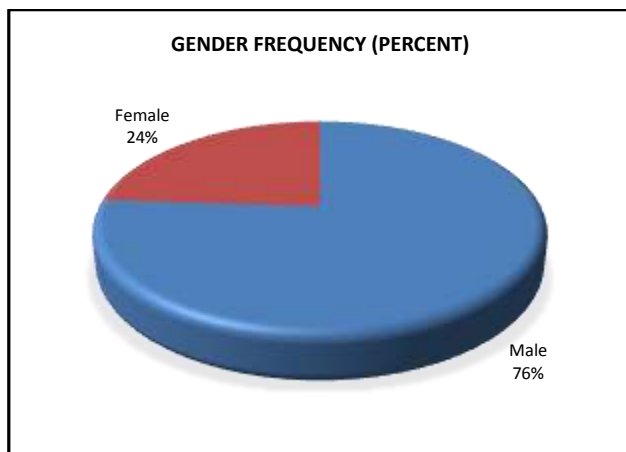


Figure 1: Graphical representation of patients included in the study (n=450)

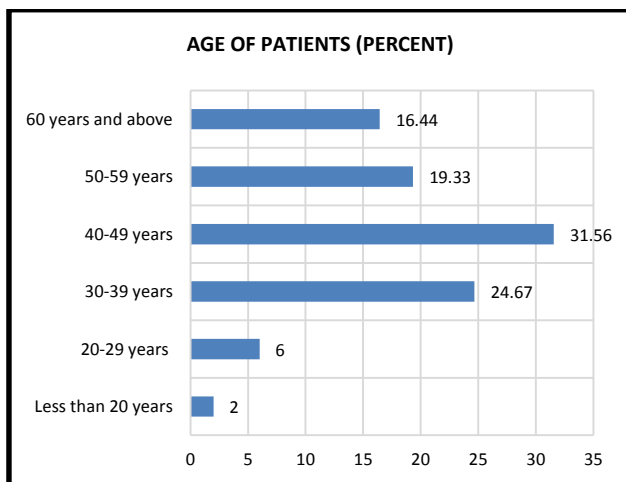


Figure 2: Graphical representation of age-distribution of patients (n=450)

Table 1: Frequency of ACS and Readmission among included patients according to NSTEMI ad STEMI (n=450)

Variable	NSTEMI	STEMI
Acute Coronary Syndrome (n=15)	12 (80 %)	3 (20 %)
Mortality (n=9)	8 (88.9 %)	1 (11.11 %)
Re-admission (n=4)	3 (75 %)	1 (25 %)

DISCUSSION

The findings of this research indicates that in RTR having acute coronary syndrome occurred in 15 patients of which 9 died (60%). Out of these 9 patient 2 (22%) died after one year, 3 (33%) after 2

years and 4 (45%) after five years. The results correlate with the result of other authors.⁸With regards to the risk factors,there were 15 RTR patients suffering from ACS. For 2 the donors were siblings (brothers), 2 were sons and the remaining 11 were relatives (including spouse) and friends. The rest 11 were not the blood relatives of the recipients. The 9 who dies due to ACS none of them were blood relatives of the recipients. One patient was reported to have improper transplant management and one patients was identified as having long duration of the procedure. Out of the 9 deaths, two patients of advanced age (more than 60 years) were suffering from dyslipidemia and were also having graft rejection, all 9 deaths were having hypertension and three were having diabetes also. All died patients (9) were using tobacco either oral (pan, gutka) or were smokers. This finding correlates with the findings of some other authors.¹²The prevalence of ACS and its complicationsafter renal transplant may also be due to stress of surgery and early graft dysfunction. Similar opinion has been reported by other authors as well.¹³The researches are of the opinion that the incidence of ACS in RTR require further analysis to control risks that are associated with ACS. This observation also supports the observation of some other authors.¹⁴

Factors for acute coronary syndrome in renal transplant recipients

Some literature reviews indicate that incidence of acute coronary syndrome specifically acute myocardial infarction is less in renal transplant recipients as compared to patients who must undergo this process. Studies also reveal other factors that are mainly responsible for increasing risk for acute coronary syndrome in renal transplant recipients.¹⁵

Kidney donor: It has been suggested by various research data that risk for acute coronary syndrome is relatively greater for renal recipients who receive kidney from deceased individuals. However, living-donor renal transplant recipients are less likely to get acute coronary syndrome, specifically after the course of transplantation.¹⁶According to some researchers, it is plausible that renal recipients with deceased-donor kidney might had excessive dose of immunosuppressive drugs, poor renal function, early acute rejection and comparatively more delayed and lower graft function than renal recipients of living-donor kidneys. Thus, these differences accelerate risk assessment for acute coronary syndrome in early duration of post transplantation of kidney.¹⁷

Age factor: Apart from other facts, age-relevant risk for acute coronary syndrome is comparatively higher after renal transplantation as compared to other patients, mainly due to age-relevant risk for acute coronary syndrome within three months after renal transplantation.¹⁸Thus, relative advantage of renal transplantation is reduced for individuals with older age. Nevertheless, renal transplantation is a foremost option for all ages of patients with kidney failure, but studies reveal that older recipients should be treated by prophylactic medication as they are more prone to perioperative acute coronary syndrome.¹⁹

Ethnic difference: Ethnic difference also play significant role in assessment of risk for acute coronary syndrome in renal transplant recipients. For instance, according to one retrospective study, black patients being on the waiting list were less likely to suffer from acute coronary syndrome than white patients. Similarly, this was the case with hispanic patients and non-hispanic patients.²⁰ As hispanic patients were kept on the waiting list and non-hispanic patients were allowed to transplant kidney, so they were at lower risk of acute coronary syndrome. However, this difference is dimnshed with passage of time after renal transplantation for black patients no matter before or after transplantation.²¹

CKD patients: In addition, certain findings demonstrate that before transplantation, patients with chronic kidney disease caused by diabetes are at higher risk of acute coronary syndrome than other chronic kidney patients where disease mainly occurs by glomerulonephritis. Kidneys are completely damaged and therefore cannot filter blood efficiently. Because of excess fluid in body, numerous health problems such as stroke and other heart diseases can take place. However, results are different after renal

transplantation as glomerulonephritis patients are more prone to acute coronary syndrome as compared to diabetic CKD (chronic kidney disease) patients.¹²

Mortality rate in renal transplant recipients

The literature on mortality rate in kidney transplant recipients (RTR) due to acute coronary syndrome (ACS) is limited. Recent research findings and the national readmissions database (NRD) indicate that all complications that are relevant to cardiovascular diseases relate to medication among kidney transplant recipients. The data primarily aggregated 49% of all hospitals in United States of America and showed more than 90% of the stratified population in the country. Acute Coronary Syndrome was examined using International Classification 9-10 codes.²³

STEMI and NSTEMI: Consequently, the studies reveal decrease in incidence of STEMI (ST-elevation myocardial infarction) hospitalization but steady trend in terms of Acute Coronary Syndrome (ACS) and Non-ST-Elevation Myocardial infarction (NSTEMI). A sort of heart attack that tends to be more serious and poses serious complications is known as an ST-elevation myocardial infarction (STEMI). It might prove to be fatal.²¹ On the contrary, non-ST-elevation myocardial infarction (NSTEMI) is less severe and wreak least impairment to heart muscles. Beyond these facts, it is necessary to divert more attention towards assessment of risk elements concerning renal transplant recipients with acute coronary syndrome. This requirement is indicated by steady readmission rate in addition to durable mortality rate within one month.²⁴

Nevertheless, current approach in immunosuppression, surgery, hospitalization and medical management and tissue typing have made renal transplantation comparatively easy and accessible as compared to past decades. Doctors usually recommend kidney transplantation to patients that are suffering from irreversible kidney damage. However, these factors have drastically accelerated risk for malignancy in addition to cardiovascular disease which ultimately leads to premature mortality in renal transplant recipients than general population. Furthermore, immunosuppressive drugs adversely effect renal transplant recipients and increase certain conventional cardiovascular factors like diabetes, hyperlipidemia and hypertension.²⁵

As a matter of fact, cardiovascular disease is the leading factor for mortality among renal transplant recipients. Cardiovascular disease includes coronary artery disease (CAD) and coronary heart disease (CHD), thus involving both heart as well as arteries. Precisely, it stops adequate blood flow to heart and adversely affects it proper working. As far as acute coronary syndrome is concerned, its incidence rate has been significantly reduced over last twenty years.²⁶ But this trend is not similar in regard of renal transplant recipients. For this retrospective study, the patients in New Zealand and Australia were analyzed with efficient renal transplant. However, within certain passage of time, most of these recipients died according to Transplant registry of New Zealand and Australia.²⁷

CONCLUSION

Based on the above findings it is concluded that ACS in RTR is worth considering a problem. While proper screening (tobacco users, diabetes, hypertension etc.) is considered mandatory, the sooth procedure and post surgical management should be considered with equal importance.

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