e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(10); 398-401

Original Research Article

Incidence of Acute Kidney Injury in Patients with Acute Myocardial Infarction

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Received: 16-07-2023 / Revised: 28-08-2023 / Accepted: 30-09-2023
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Conflict of interest: Nil

Abstract:

Background: The purpose of this study is to evaluate the incidence of Acute Kidney Injury, as defined by the KDIGO, in the acute phase of a myocardial infarction, thereby making vigorous efforts to preserve renal function as we attempt to salvage and protect cardiac muscle.

Methods: Cohort study was conducted on patients admitted with Acute Myocardial Infarction in Government Medical College and Associate group of Hospital, KOTA (Rajasthan).

Results: The incidence of Acute Kidney Injury in hospitalized patients presenting with Acute myocardial Infarction is 29%. Development of AKI is associated with poor outcome in terms of in hospital mortality of acute MI patients, with p= 0.001.

Conclusion: Acute Kidney injury is an important and common complication occurring in acute MI patients. All the more, there is an increase need for more prospective studies to document the incidence of acute renal insufficiency occurring during critical illness such as MI, and the associated comorbidities so that the treatment modalities can be altered accordingly so as to prevent further damage to the kidneys during the acute phase of illness, and by educating the patient to be on long term follow up to identify early before these acutely injured pair of kidneys fail irreversibly so that necessary measures can be initiated to ensure better quality of life in such patients.

Keywords: MI, AKI, Mortality.

Introduction

Acute Kidney Injury (AKI) is a complex syndrome occurring due to various etiological factors, such as decreased intravascular fluid volume, decreased cardiac output, infections, drugs, etc. The spectrum of AKI ranges from mild elevation of serum creatinine to anuric renal failure leading on to a dialysis requiring stage.

The lack of a uniform definition led to conflicting epidemiological data on Acute Kidney Injury in various parts of the world, until 21st century.

The latest definition of AKI, as per Kidney Disease: Improving Global Outcomes (KDIGO) Acute kidney injury Work Group, 2012 is : AKI is defined as any of the following (Not Graded): Increase in Serum creatinine (S.Cr) by 0.3 mg/dl (x26.5 µmol/l) within 48 hours; or increase in S.Cr to x1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or urine volume 0.5 ml/kg/h for 6 hours. [1]

Ischemic heart disease is the single most important cause of death among adults and with increased incidence of acute coronary events in young adults, it accounts for a substantial fraction of the total disease burden globally. AKI is an important and common complication occurring after acute myocardial infarction (AMI), the development of which is associated with unfavourable outcomes and higher mortality after an acute myocardial infarction.

The mechanisms causing AKI in the first few days after an AMI are multifactorial, including systemic and renal hemodynamic changes secondary to an impaired cardiac output and an imbalance of vasodilators and vasoconstrictors, the use of contrast media, and immunological and inflammatory kidney damage resulting from crosstalk between the heart and the kidney. [2]

Therefore, acute kidney injury, if not identified & intervened at the earliest, may become partly irreversible or even progress to chronic kidney

disease, which has a profound impact on cardiovascular outcomes in patients with acute coronary syndromes as well as in the general population. [3] Worsening of renal function during admission for myocardial infarction is a powerful and independent predictor of in-hospital and 1-year mortality [4]

The purpose of this study is to evaluate the incidence of Acute Kidney Injury, as defined by the KDIGO, in the acute phase of a myocardial infarction, thereby making vigorous efforts to preserve renal function as we attempt to salvage and protect cardiac muscle.

Materials & Methods

Study Centre: Govt Medical College and Associated Hospitals, Kota

Study Design:- Cohort Study

Study Period: 01 year -April 2021 to 2022

Sample Size: 100 cases

Inclusion Criteria:

- Patients admitted with Acute Myocardial Infarction in Government Medical College and Associate group of Hospital, KOTA (Rajasthan) was included in this study.
- Individual above 18 year of age
- Able and willing to give informed written consent to participate in the study.

Exclusion Criteria:

- Age less than 18 years
- Pre-existing Chronic Kidney disease

Methodology

After obtaining informed written consent, all individuals who meet the inclusion and exclusion criteria will be included in the study. A basic demographic details, detailed clinical history, physical examination, and basic investigations will be done and entered in the prescribed pro-forma on individuals admitted with acute Myocardial infarction. For the history of diabetes, hypertension and prior coronary artery disease, appropriate medical documents will be taken into account.

Statistics:

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Paired groups the Paired sample t-test was used & for Independent groups the Unpaired sample t-test was used. To find the significance in categorical data Chi-Square test and Fisher's exact test was used. In all the above statistical tools the probability value 0.05 is considered as significant level.

Results

Table 1: Group statistics of study population in AKI (n=29) and Non-AKI-(n=71) groups (T-test)

Parameters	Non-AKI n(107)			AKI n(43)			p value
	Mean	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	
Age (years)	58.95	8.59	1.02	62.31	11.14	2.07	0.1087
Systolic Blood Pressure (mm Hg)	140.56	26.07	3.09	143.44	34.15	6.34	0.6483
Diastolic Blood Pressure (mm Hg)	84.92	13.61	1.61	85.86	12.68	2.35	0.752
Blood Sugar on admission (mg/dL)	166.07	63.42	7.52	159.68	59.04	10.96	0.6427
Serum Creatinine-on admission (mg/dL)	1.01	0.91	0.1	0.89	0.32	0.06	0.4683
Serum Creatinine –after 48 hours (mg/dL)	0.94	0.26	0.03	1.76	0.7	0.13	**0.0001**
Serum Cholesterol (mg/dL)	220.53	50.16	5.95	221.82	69.54	12.91	0.9174
Serum Triglyceride (mg/dL)	128.45	67.86	8.05	120.86	28.95	5.37	0.5635
Chest pain duration (in hours)	4.65	8.9	1.05	11.53	13.02	2.41	**0.003**
Hemoglobin(gm/dL)	12.22	1.95	0.23	11.9	1.69	0.31	0.4508

Table 2: Distribution of History of Coronary Artery Disease among Non- AKI (n=29) and AKI (n=71) patients

History of CAD	Non AKI	AKI
Present, n (%)	16	9
Absent, n (%)	55	20

Table 3: 5-day IN-HOSPITAL MORTALITY & AKI Non-AKI (n=71) and AKI (n=29) patients

5-day In-Hospital mortality	Non-AKI	AKI	Total
Died	9	11	20
Survived	62	18	80

Discussion

The Percentage of patients with history of smoking with Non-AKI group was 19% and those with AKI was 10%. Yet again, the comparison between history of smoking and AKI shows the statistical significance with p=0.001. According to ALEXANDER T et al study young patient age less the 45 yr and smoker develop AKI in 57% patient

and age more then 45yr and smoker devlop 31% AKI in acute myocardial patient. There is positive correlation (p=0.001) in this study and reveals the presence of history of smoking is a risk factor for the development of AKI in MI patients. Smoking was the most common risk factor and its use was significantly more in younger myocardial infarction (MI) patients than in older patients (57% vs 31%; p<0.001) [5-9]

The comparison between mortality and AKI shows highly significant p value =0.001 which means the presence of AKI have higher mortality rate (11%) than the non AKI patients (9.0%), thus making Acute Kidney Injury a definite risk factor for mortality in MI patients, which is the primary aim of our study. According to MEZHONOV EM et al study among total AMI patient 20.5% devlop AKI.This study also show there was increase inhospital mortality with AKI(p=0.001). NICOLA COSENTINO et al study show among total AMI patient AKI devlop in 7% patient and in total AKI patient 27% died which show positive correlation in mortality with AKI in acute myocarial infarction patient. [10-15]

Conclusion

The incidence of Acute Kidney Injury in hospitalized patients presenting with Acute myocardial Infarction is 29%. Development of AKI is associated with poor outcome in terms of in hospital mortality of acute MI patients, with p= 0.001. Acute Kidney injury is an important and common complication occurring in acute MI patients. All the more, there is an increase need for more prospective studies to document the incidence of acute renal insufficiency occurring during critical illness such as MI, and the associated comorbidities so that the treatment modalities can be altered accordingly so as to prevent further damage to the kidneys during the acute phase of illness, and by educating the patient to be on long term follow up to identify early before these acutely injured pair of kidneys fail irreversibly so that necessary measures can be initiated to ensure better quality of life in such patients.

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