



Heart failure in patients of acute ST elevation myocardial infarction with impaired renal function

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Abstract

Introduction: Ischemic heart disease (IHD) is a common cardiac disorder and significant cause of mortality and morbidity worldwide. Effective risk stratification is integral to the management of patients with acute coronary syndromes and associated chronic kidney disease may adversely affect acute STEMI outcome.

Objective: in this study our main goal is to detect the incidence of heart failure in patients of acute STEMI patients with impaired renal function.

Method: This prospective study was done in the cardiology department of cardiology in NICVD after approval of protocol for one year.

Results: For these purpose 100 patients of STEMI diagnosed by clinical, biochemical and ECG criteria were included in the study. After getting serum creatinine level, eGFR was calculated and if it is <60ml/min then the patient was selected for the study. Among the 100 patients inferior MI was 34%, anterior MI was 20%, extensive anterior MI was 12%, anteroseptal MI was 18%, Inferolateral MI was 10%, lateral MI was 2%, high lateral MI was 3% and anteroinferior was 1%. Of these patients heart failure was found in 21% patients.

Conclusion: From this study it can be concluded that impaired renal function among MI patients has an adverse outcome. Early detection of renal impairment is necessary to avoid increased mortality and morbidity.

Keywords: STEMI, Renal Impairment, Heart failure.

Introduction

Coronary heart disease is a worldwide health epidemic. Worldwide 30 percent of all deaths can be attributed to cardiovascular disease of which more than half are caused by coronary heart disease. Globally of those dying from

cardiovascular disease, 80 percent are in developing countries¹. In 2001 it was estimated that worldwide coronary artery disease was responsible for 11.8 per cent of all death in low income countries². Incidence of coronary artery disease in Bangladesh has increased from 3.3 per

thousand to 14 per thousand from the year 1975 to 1985³. Acute STEMI is defined by at least two of the followings in which typical ECG changes is a must and any one either typical chest pain of cardiac origin or significantly raised troponin I level⁴. In STEMI cigarette smoking, male gender and a family history of cardiovascular and renal disease are associated with adverse prognosis in young patients, whereas dyslipidaemia, hypertension and diabetes mellitus are associated with adverse prognosis in the elderly⁵.

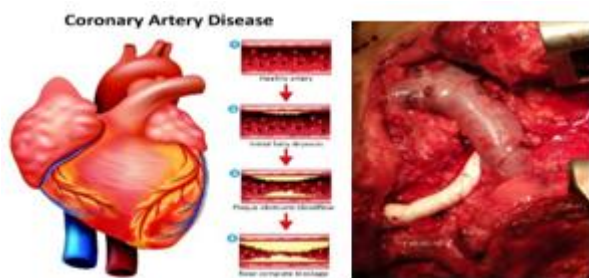


Figure-1: Coronary heart disease and during surgery

Impaired renal function is manifested by decreased GFR. Decreased GFR is measured by increased serum creatinine or more precisely by reduced creatinine clearance (<60ml/min). It is an independent risk factor for CAD outcome⁶⁻⁷. Mild renal impairment is associated with an increased risk of coronary artery disease and stroke, suggesting that cardiovascular disease may develop early in the course of renal dysfunction⁸⁻⁹. So it is a time demand to do a study to see the incidence of heart failure in patients of acute STEMI patients with impaired renal function.

Objective

General Objective

- To identify the Incidence of heart failure in patients of acute ST elevation myocardial infarction with impaired renal function

Methodology

Study Type

- This was a prospective observational study.

Study Period and Place

- This study was conducted at National Institute of Cardiovascular Diseases (NICVD) within a period of one year from January 2011 to December 2011 after the approval of ethical review committee. For this purpose, 100 patients of acute ST elevation MI with impaired renal function were included in this study.

Inclusion Criteria

- acute STEMI within twelve hours after the onset of chest pain who are eligible for thrombolysis
- eGFR <60ml/min (Cockcroft-Gault formula), Voluntary given consent to participate in the study.

Method

A patient with diagnosed case of MI or his/her legal guardian was thoroughly informed about the aims, objectives and detailed procedure of the study before examination. He/She was encouraged for voluntary participation and allowed freedom to withdraw from the study whenever he/she liked even after participation. From all eligible subjects after getting consent clinical history was taken and clinical examination was done to elicit findings related to MI. Related investigations like blood sugar and serum creatinine were done. Blood was collected within two hours after admission of the patient in the hospital. If the patients calculated eGFR is less than 60 ml/min and ECG criteria confirms the acute STEMI then he/she was included in the study as case. Patients were followed up till discharge with special attention to serum creatinine and development of other complications. The researcher did not influence the ongoing hospital treatment. The endpoint of the study was sudden cardiac death or rise of serum creatinine double of the baseline value. All relevant data was noted in the pre tested data sheet. All data were checked and rechecked to avoid error. All investigations were done in National Institute of Cardiovascular Diseases (NICVD).

Data Analysis

by using computer bases software SPSS-19(Statistical Package for Social Science). Discrete or qualitative variables was analyzed by Chi-squared test and continuous variables will be analyzed by t- test. P value will be considered as statistically significant when it is less than 0.05.

Results

In table-1 shows Distribution of age between the study groups (n = 100) where Most of the patients (67%) were in between 41-60 years in this study.

The following table is given below:

Table 1: Distribution of age between the study groups (n = 100)

Age in Groups	(n = 100)	
	Frequency	%
<40 yrs	14	14.0
41-50 yrs	32	32.0
51 – 60 yrs	35	35.0
61 – 70 yrs	19	19.0
> 70 yrs	0	0.0

In figure-2 shows distribution of gender (n = 100) where among 100 patients, 77 were male and 23 were female. The following figure is given below:

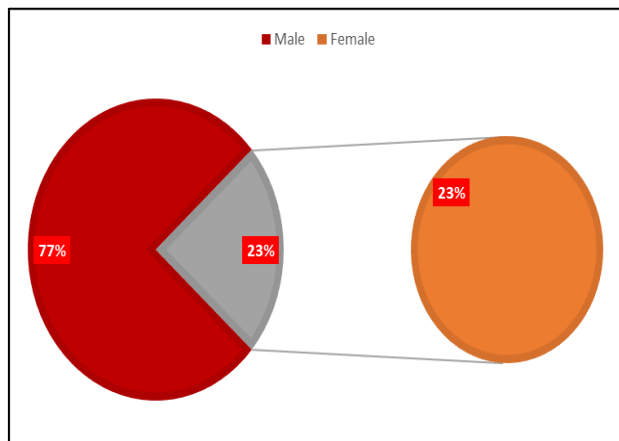


Figure 2: Distribution of gender (n = 100)

In figure-3 shows Examination findings where the incidence of heart failure was 21%.Among the heart failure patients raised JVP was found in 12%, gallop rhythm was 10% and basal crepitation was 21%. The following figure is given below:

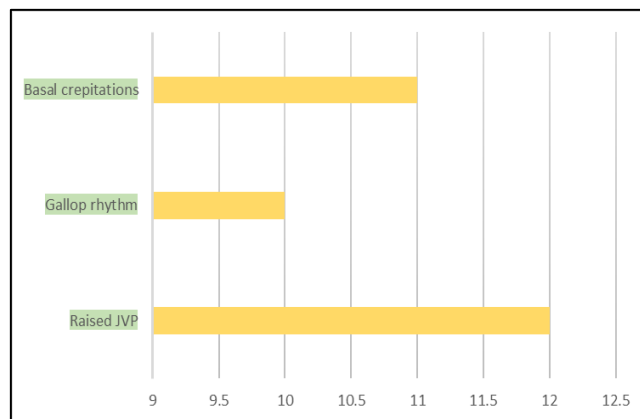


Figure-3: Examination findings

In table-2 shows Distribution of investigation findings where patients LVEF (%) was found 50.82 ± 9.99 (Mean \pm SD), random blood sugar was found in 222.82 ± 72.16 , serum creatinine was found in 1.62 ± 0.37 . The following table is given below:

Table 2: Distribution of investigation findings (n = 100)

Investigations	(n = 100)
	Mean \pm SD
LVEF (%)	50.82 ± 9.99
RBS (mg/dl)	222.82 ± 72.16
LDL C	210 ± 23.8
Serum creatinine	1.62 ± 0.37

In table-3 shows Distribution of types of myocardial infarction among the study population where In patients Inferior MI was 34%,anterior MI was 20%,Extensive anterior MI was 12%, Antero-septal MI was 18%, Infero-lateral MI was 10%, Lateral MI was 02%, High lateral MI was 03%, Anteroinferior MI was 01%.

Table 3: Distribution of types of myocardial infarction among the study population

Types of MI	Total (n = 100)	
	Frequency	%
Inferior	34	34.0
Anterior	20	20.0
Extensive Anterior	12	12.0
Antero-septal	18	18.0
Infero-lateral	10	10.0
Latera	2	2.0
High lateral	3	3.0
Anteroinferior	1	1.0

In table-4 shows Incidents of heart failure patients stratified by eGFR (n = 100) where Out of 21 heart failure patients, eGFR was 60-30ml/min in

11patients, 30-15ml/min in 6 patients, <15ml/min in 4 patients. The following table is given below:

Table 4: Incidents of heart failure patients stratified by eGFR(n = 100)

	eGFR						P-value
	60-30 (n = 71)		30-15 (n = 22)		<15 (n = 7)		
	N	%	n	%	N	%	
Heart Failure(n=21)	11	15.4	6	27.2	4	57.8	0.026 ^S

Discussion

Acute myocardial infarction (AMI) is one of the major health problems all over the world and the coronary artery thrombosis is the leading cause of it¹⁰. In the developing country like Bangladesh, urbanization is taking place at a rapid pace that is responsible for change in the lifestyle which adversely affects the metabolism thereby causing a large increase in the number of diabetic patients¹¹.

In the present study, among 100 patients male was 77% and female was 23%. Male to female ratio was 3.34:1. A higher prevalence of ischemic heart disease in male than female has been reported in a study from England. Thus the present results are in agreement that male population is more prone to STEMI which may be linked to genetic/hormonal difference.

The present study showed among the 100 patients most of the patients were in age group 51-60 years (35%) next to which was 41-50 years (32%). Mean \pm SD of age was 52.84 \pm 8.40 years.

Regarding the evaluation of risk factors of STEMI hypertension was found in 61%, smoker was 52%, dyslipidemia was present in 78%, DM was in 31%, sedentary life style was found in 23% patients obesity was common among 23 % of total patients and family history of IHD was found in 24% of patients. The results of present study with reference to risk factors were similar to those published earlier that type 2 diabetic patients were more hypertensive than non-diabetic. 48% patients were found hypertensive in the diabetic group where as only 36% patients were found

hypertensive in non diabetic group. All of the above findings are consistent with the earlier study¹².

Of the 100 patients in inferior MI was 34%, anterior MI was 20%, extensive anterior MI was 18%, anteroseptal MI was 12%, Inferolateral MI was 10%, lateral MI was 2%, high lateral MI was 3% and anteroinferior was 1%. The present study found non-significant difference in the site of infarction among all patients. Inferior and anterior infarction were found commonest. In some studies, lateral infarction was found common in diabetic group¹³. But in the present study it was not found which may be due to small size.

Regarding analysis of complications and outcome Mean \pm SD of hospital stay of the study patients was 4.51 \pm 0.77 days. Left ventricular ejection fraction was found in 50.82 \pm 9.99% and random blood sugar was found in 222.82 \pm 72.16 mg/dl. Among the 100 patients heart failure was found in 21%. This finding are as expected from the patients with STEMI¹⁴.

Regarding eGFR and different complications more were found with low eGFR. We have shown that, in patients admitted with STEMI and across each STEMI grouping, creatinine clearance is an important independent predictor of hospital mortality. In our study 4 cases died with low eGFR. A 10 ml/min decrease in creatinine clearance had the same adverse impact on hospital death rates as a 10-year increase in age. Increased renal dysfunction was observed more often in elderly (aged > 65 years) and female patients. It is well known that renal function decreases with age,

and women are considerably older than men when they are admitted with an STEMI, which may partially explain the predominance of women with reduced renal function¹⁵.

Increased creatinine concentrations are common in older patients and are independently associated with an increased risk of death, cardiovascular disease, and congestive heart failure. It can be said that the increased risk of death begins with mildly elevated concentrations of serum creatinine.

Conclusion

From the present study it can be concluded that increased incidence of heart failure occurs among MI patients with impaired renal function. Early detection of renal impairment is necessary to avoid increased mortality and morbidity.

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