Incidence of Cardiogenic Shock in Patients of Acute ST Elevation Myocardial Infarction with Impaired Renal Function

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ABSTRACT

Introduction: Cardiogenic shock is a medical emergency resulting from inadequate blood flow due to the dysfunction of the ventricles. Myocardial infarction is commonly known as a heart attack, occurs when blood flow decreases or stops to a part of the heart. 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: The aim of this prospective study was to detect the incidence of cardiogenic shock in patients of acute ST elevation myocardial infarction with impaired renal function.

Method: The study was done in the Cardiology Department of CMCH after approval of protocol for 1 year. For these purpose 200 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. Patients will be followed up to hospital stay to see the outcome. Biochemical and clinical parameters was included in the data sheet from the eligible subjects.

Results: Among 200 patients 97% presented with chest pain, breathlessness was found in 65% of patients and cardiogenic shock was found in 14% patients.

Keywords: Myocardial Infarction, STEMI, Renal Impairment, Heart Disease, Outcome.

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INTRODUCTION

Coronary heart disease refers to a narrowing of the coronary arteries, the blood vessels that supply oxygen and blood to the heart. It is also known as coronary artery disease. It is a major cause of illness and death. Cardiogenic shock is a medical emergency resulting from inadequate blood flow due to the dysfunction of the ventricles of the heart.[1-3] There are distinctive sorts of stun - cardiogenic, hypovolemia, septic, to say a couple. Notwithstanding, none of these are elite. Patients can have consolidated sorts of stun too. Stun by definition is deficient blood flow to whatever remains of the body, which causes organ harm. Organs don't have enough oxygen conveyance, and can't sufficiently keep up their cell digestion. Cardiogenic stun is an unmistakable sort in light of the fact that the etiology is from heart brokenness regardless of sufficient filling weights. Besides, there are subsets of cardiogenic stun also cardiomyopathic, arrhythmic and mechanical. Reason for CS is assorted; however these are the most well-known etiologies. CS is most generally encouraged

by intense myocardial localized necrosis.[4] Cardiogenic shock is caused by the failure of the heart to pump effectively. It can be due to damage to the heart muscle, most often from a large myocardial infarction. Other causes include abnormal heart rhythms, cardiomyopathy, heart valve problems, ventricular outflow obstruction or ventriculoseptal defects. It can also be caused by a sudden decompressurization.[5,6]

Treatment of cardiogenic stun relies upon the reason. On the off chance that cardiogenic stun is because of a heart assault, endeavors to open the heart's conduits may help. An intra-aortic inflatable pump or left ventricular help gadget may enhance matters until the point when this should be possible. Solutions that enhance the heart's capacity to contract (positive inotropes) may help; be that as it may, it is vague which is ideal. Norepinephrine might be better if the pulse is low though dopamine or dobutamine might be more valuable if just marginally low. Cardiogenic stun is a condition that is hard to completely switch even with an early

determination. All things considered, early commencement of mechanical circulatory help, early percutaneous coronary intercession, inotropes, and heart transplantation may enhance results.[7] Myocardial infarction (MI), commonly known as a heart attack occurs when blood flow decreases or stops to a part of the heart, causing damage to the heart muscle. The most common symptom is chest pain or discomfort which may travel into the shoulder, arm, back, neck, or jaw. Often it occurs in the center or left side of the chest and lasts for more than a few minutes. The discomfort may occasionally feel like heartburn.[8]
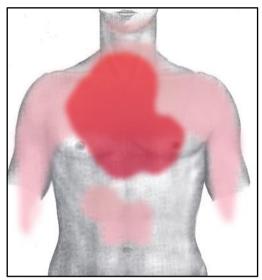

Figure 1A: Areas where pain is experienced in myocardial infarction, showing common (dark red) and less common (light red) areas on the chest.[9] (Source: Kasper et.al, 2015)

Figure 1B: Diagram showing the blood supply to the heart by the two major blood vessels, the left and right coronary arteries (labelled LCA and RCA). A myocardial infarction (2) has occurred with blockage of a branch of the left coronary artery (1).[10] (Source: J. Heuser, 2006)

Chest pain is the most common symptom of acute myocardial infarction and is often described as a sensation of tightness, pressure, or squeezing. Pain radiates most often to the left arm, but may also radiate to the lower jaw, neck, right arm, back, and upper abdomen. The pain most suggestive of an acute MI, with the highest likelihood ratio, is pain radiating to the right arm and shoulder. Similarly, chest pain similar to a previous heart attack is also suggestive. The pain associated with MI is usually diffuse, does not change with position, and lasts for more than 20 minutes. Levine's sign, in which a person localizes the chest pain by clenching one or both fists over their sternum, has classically been thought to be predictive of cardiac chest pain, although a prospective observational study showed it had a poor positive predictive value. Pain that responds to nitroglycerin does not indicate the presence or absence of a myocardial infarction.
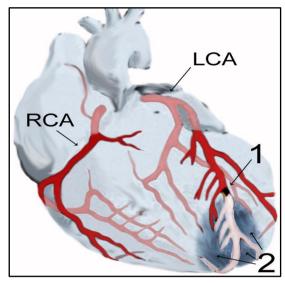
OBJECTIVES
General Objective
- To detect the incidence of cardiogenic shock in patients of acute ST elevation myocardial infarction with impaired renal function.
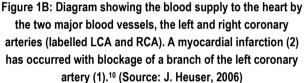
Specific Objectives
- To examine Clinical finding of Patients of MI
- To evaluate Examination findings of Raised JVP and Gallop rhythm

MATERIALS AND METHODS
Types of Study: This study was a prospective observational study.

Place of Study: Cardiology Department of Chittagong Medical College Hospital.

Study Population: Patients of acute STEMI with impaired renal function admitted in CMCH Cardiology Department.

Sampling Technique: 200 patients were selected by Purposive sampling.

Study Period: 1 year 6 Months

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

Exclusion Criteria
- Non- STEMI
- Patients who are not eligible for thrombolysis
- STEMI with previous history of MI
- STEMI Patients with history uvular heart disease, cardiomyopathy and congestiveheart failure
- Patients with STEMI presenting with VT or VF

Data Collection and Analysis
Data were collected from every individual investigation subject which was recorded in the wake of getting educated composed assent on a pre-framed information sheet. Gathered information was checked more than once. Information was gathered by the specialist himself. Information was prepared and broke down by utilizing SPSS software. After analyzing the data it presented by tables, graphs and charts etc for the report. Case record form, ECG tracing.

Table 1: Distribution of age between the study groups (n = 200)

Age in Groups	(n = 200)	
	Frequency	%
<40 yrs	30	15.0
41-50 yrs	62	31.0
51 – 60 yrs	70	35.0
61 – 70 yrs	38	19.0
> 70 yrs	0	0.0
Total	200	100

Table 2: Examination findings of the patients

Clinical Examinations	(n = 200)
	Mean ± SD
Heart Rate (per minute)	88 ± 15
Respiratory rate(bpm)	23 ± 7
Systolic BP (mmHg)	136.75 ± 19.25
Diastolic BP (mmHg)	85.30 ± 11.52
BMI (Kg/m^2)	25.76 ± 2.51

Table 3: Examination findings of Raised JVP and Gallop rhythm

Clinical Examinations	n (%)
Raised JVP	24(12%)
Gallop rhythm	20(10%)
Basal crepitations	42(21%)

Table 4: Distribution of types of myocardial infarction among the study population (n = 200)

Types of MI	Total (n = 200)	
	Frequency	%
Inferior	68	34.0
Anterior	40	20.0
Extensive Anterior	24	12.0
Antero-septal	36	18.0
Infero-lateral	20	10.0
Lateral	4	2.0
High lateral	6	3.0
Anteroinferior	2	1.0
Total	200	100

RESULTS

In Table 1 is showing age group distribution where among the 200 patients most of the patients were in age group 51-60 years (35%) next to which was 41-50 years (31%). Mean ± SD of age was 52.84 ±8.40 years.

In Figure 2 is shows gender distribution where among 200 patients male was 70% and female was 30%. Male to female ratio was 3.34:1.

Table 2 shows that Examination findings of the patients where Mean ± SD of heart rate was found 88 ± 15, systolic blood pressure was found 136.75 ± 19.25, diastolic pressure was found 85.30 ±11.52 and BMI was 25.76 ± 2.51Kg/m^2. Table 3 shows Examination findings of Raised JVP and Gallop rhythm where Basal crepitations are highest among all which is 42 (21%).

Table 4 shows distribution of types of myocardial infarction among the study population, (n = 200) where Inferior and anterior MI is 34 and 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%.

In Figure-3 shows clinical demonstrations of cardiac shock where 14 % which was less among others.
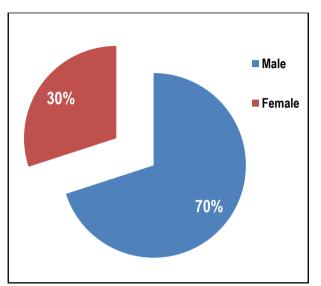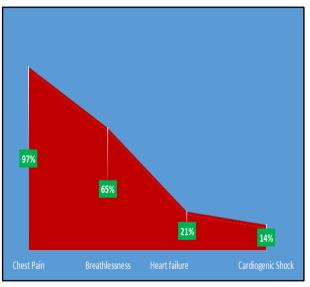

Figure 2: Distribution of sex (n= 200)

Figure 3: Clinical demonstrations of cardiac shock

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 it.[11] 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 patients.[12] In the present study, among 200 patients, male was 70% and female was 30%. 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.[13] 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 200 patients most of the patients were in age group 51-60 years (35%) next to which was 41-50 years (32%). Mean ± SD of age was 52.84 ±8.40 years. In a study done in Pakistan it was found that the mean age was 55.69 ± 13.45. It was found that patients with risk factors had below 40 age group which suggests that STEMI is now occurring in relatively young people in Bangladesh.

In another study[12]; STEMI occurred in 26.5% cases in age less than 55 years, in 23.1% cases in age 55-64 years, in 27.7% cases in age 65-74 years, in 18.9% cases in age 75-84 years and 3.8% cases in age more than 85 years. Thus the results of the present study were consistent with the previous reports.[11,12] 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.[14] 48% patients were found hypertensive in the diabetic group whereas only 36% patients were found hypertensive in non-diabetic group. All of the above findings are consistent with the earlier study[13] Of the 100 patients in inferior MI was 34%, anterior MI was 20%, extensive anterior MI was 18%, aneroseptal 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 was found commonest. In some studies lateral infarction was found common in diabetic group[14] But the present study it was not found .In the analysis of all data, investigators concluded that only severely reduced renal function was associated with increased mortality after acute myocardial infarction, and the risk associated with moderate renal dysfunction may be explained by the presence of other comorbidities.

Different pathophysiological mechanisms may play a part in explaining these discrepant results. These include accelerated atherosclerosis and a greater prevalence of comorbidities acting over a longer period of time. The GRACE findings are in agreement with the results of an earlier study18 of 2763 patients, in which renal insufficiency was an independent risk factor for cardiovascular events in patients with known coronary artery disease. Furthermore, Fried and colleagues, using data from nearly 6000 patients in the cardiovascular health study, reported recently that 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
In many study recommended more aggressive use of early mechanical revascularization, including early CABG surgery, in patients with AMI complicated by cardiogenic shock and Early mechanical revascularization in patients with acute myocardial infarction (AMI) complicated by cardiogenic shock is a therapeutic strategy that reduces mortality which has been a class I recommendation in guidelines from the American College of Cardiology and the American Heart Association since 1999 for patients younger than 75 years. In present times, from study it can be concluded that impaired renal function among MI patients has an adverse outcome.

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