Original Paper

A Comparative Study on Short-term Clinical Outcome in Acute Coronary Syndrome

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Abstract

Introduction: Coronary artery diseases are currently the major cause of death in developing countries. Acute coronary syndrome (ACS) is defined as any group of clinical symptoms compatible with acute myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina (UA) to non-ST elevation myocardial infarction (NSTEMI) to ST-elevation myocardial infarction (STEMI). Accurate diagnosis and management of ACS has life-saving implications of its outcome.

Objective: To compare the outcomes of STEMI and NSTEMI in a percutaneous coronary intervention (PCI) capable centre.

Materials and Methods: The patients who undergone percutaneous coronary intervention (PCI) in Combined Military Hospital, Dhaka were considered from January 2013 to January 2017. Diagnosis of acute MI was based on the clinical presentation, electrocardiogram (ECG) and raised highly sensitive troponin I. Acute MI patients were classified into 2 groups, STEMI and NSTEMI. Their coronary risk factors, co-morbidity, ECG, echocardiogram, coronary angiographic (CAG) findings and short-term outcomes were collected. All statistical data were analysed by SPSS 22.0 software.

Results: There were 464 patients enrolled for analysis. Among them, 208(44.8%) patients had STEMI and 256(55.2%) had NSTEMI. The ratio of male/female was greater in STEMI as compared to NSTEMI (4.0 vs 1.9; p=0.041). Among NSTEMI patients, 88(34.4%) had ST depression, 168(65.6%) patients had other ECG changes like T wave abnormalities in 66(25.7%) and poor R-wave progression in 16(6.3%). NSTEMI patients had less regional wall motion abnormality on echo cardiogram (p=0.0045). As a complication heart failure (36% vs 9.3%), cardiogenic shock (16.8% vs 15.6%), atrial fibrillation (7.2 vs 0.78 %), ventricular tachycardia (2.8% vs 0.5%), reinfarction (3 % vs 0.78%) and death (2.4% vs 0.40%) were observed more in STEMI patients than NSTEMI respectively. NSTEMI patients had less regional wall motion abnormality on echocardiogram (p=0.0045). As a complication heart failure (36% vs 9.3%), cardiogenic shock (16.8% vs 15.6%), atrial fibrillation (7.2% vs 0.78%), ventricular tachycardia (2.8% vs 0.5%), reinfarction (3% vs 0.78%) and death (2.4% vs 0.40%) were observed more in STEMI patients than NSTEMI respectively. Coronary angiogram shows that left anterior descending artery was the most commonly involved artery in STEMI; however, the left circumflex artery or right coronary artery was involved more commonly in NSTEMI (p<0.001).

Conclusion: The first step in successful treatment of acute MI depends on early diagnosis. Inspite of immediate management, STEMI had relatively worse outcome compared to NSTEMI.

Key-words: Acute coronary artery disease, Acute coronary syndrome, ST-elevation myocardial infarction (STEMI), Non-ST elevation myocardial infarction (NSTEMI).

Introduction

Acute myocardial infarction (MI) significantly contributes to mortality and morbidity in developing countries. To reduce mortality and morbidity, early clinical diagnosis of obstructive coronary artery diseases with subsequent management is necessary for all patients with chest discomfort or other symptoms suggestive of an acute coronary syndrome (ACS)[1-3]. Although there are increasing numbers of methods to diagnose acute MI, but electrocardiography (ECG) is considered a quick, easily accessible tool, and it is the most important initial investigation for diagnosis of myocardial ischemia and MI[4]. ST-segment elevation MI (STEMI) can easily be diagnosed from clinical manifestations and typical ECG changes. The introduction of new therapeutic modalities, including invasive cardiac procedures and new medications, play a major role in outcome of these patients. We conducted this study to compare outcome of NSTEMI and STEMI patients.

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Materials and Methods

This retrospective study was carried out in Combined Military Hospital, Dhaka from January 2013 to January 2017 with a view to compare short term clinical outcome between STEMI and NSTEMI patients. There were 464 patients enrolled for analysis and among them 208 patients (44.8%) had STEMI and 256(55.2%) had NSTEMI. The diagnostic criteria of STEMI were an ST segment elevation of ≥ 2 mm in adjacent chest leads and/or an ST segment elevation of >1 mm in two or more standard limb leads or a new Left Bundle Branch Block (LBBB) and presence of positive cardiac biomarkers. NSTEMI was diagnosed in the absence of ST segment elevation and positive highly sensitive troponin I, CK-MB. PCI was performed according to standard procedures. Their age, coronary risk factors, co-morbidities, ECG, echocardiogram, angiographic findings and short-term outcomes were collected. All statistical data were analyzed by SPSS 22.0 software and p<0.05 was considered statistically significant.

Results

Among 464 patients, 256 were included in NSTEMI and 208 patients from STEMI group; 164(78.84%) male patients sustained acute STEMI whereas female were 44(21.15%). In NSTEMI male patients were 172(67.1%) and female were 84(32.8%).

Distribution of patients according to sex, age, cardiac risk factors are shown in Figure-1,2,3 respectively. Compared to patients of STEMI, patients of NSTEMI were older. The incidence of cardiovascular risk factors such as hypertension, diabetes and hypercholesterolemia were higher in NSTEMI patients than patients of STEMI (P<0.05). In addition, coronary angiographic (CAG) shows that the incidence of multivessel involvement in NSTEMI patients were higher than that in STEMI patients (P<0.001).

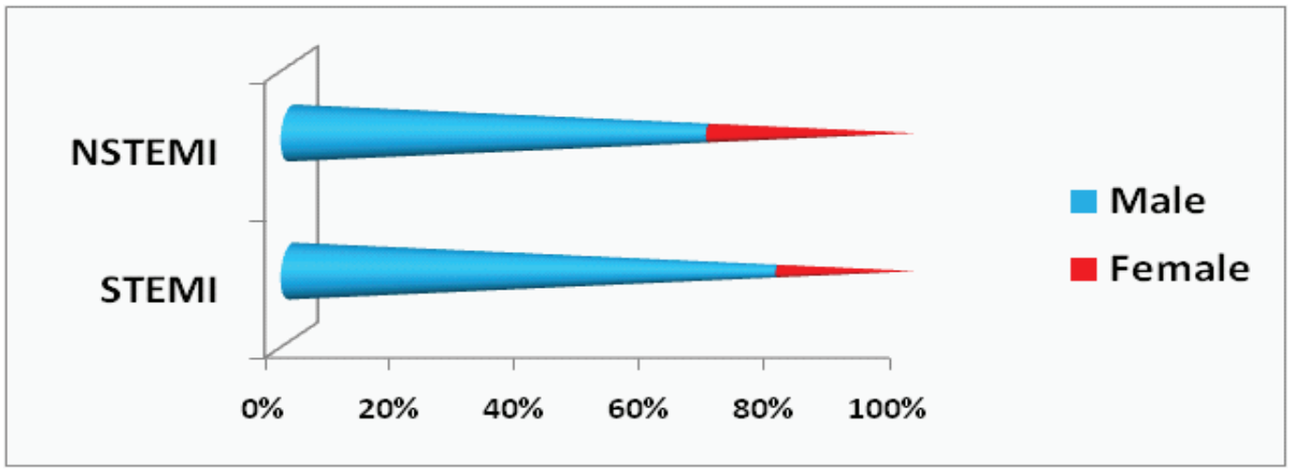

Fig-1: Patient distribution in MI

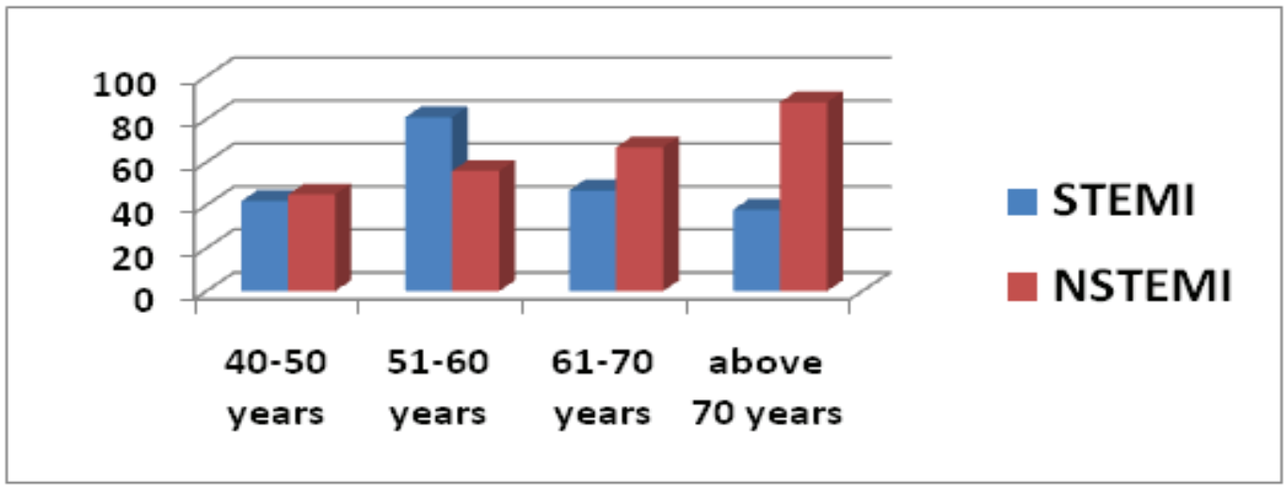

Fig-2: Age distribution among MI patients

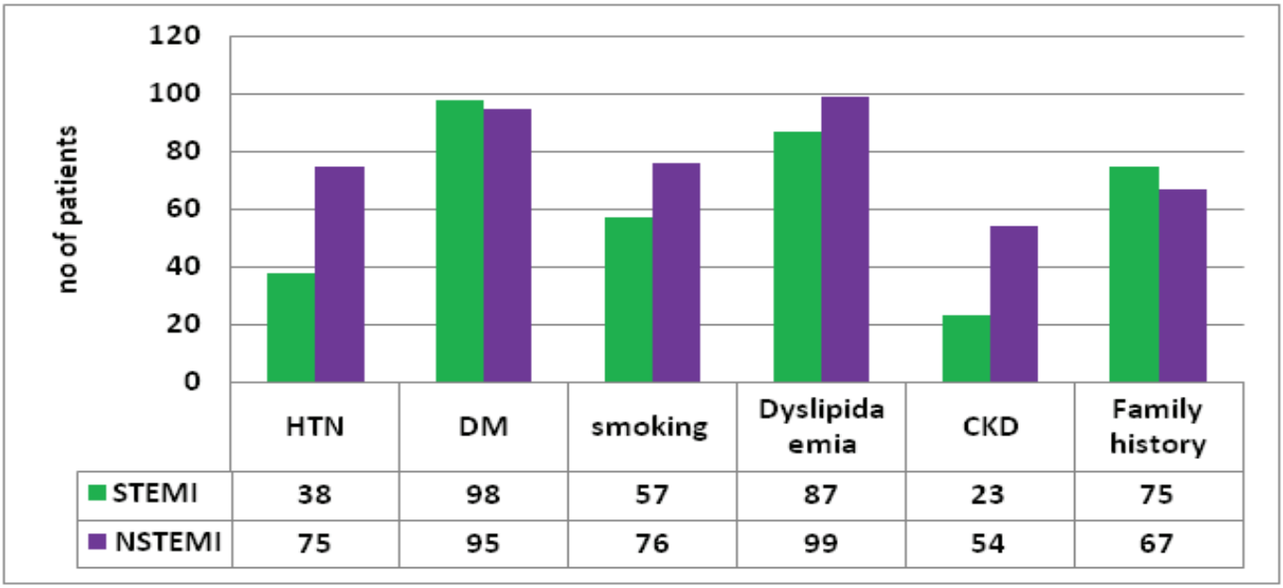

Fig-3: Major CAD risk factors for MI patients

Identification of ST-segment elevation in ECGs is easy; however, NSTEMI patients had various types of ECG findings (Figure-4). Among NSTEMI patients, 88 (34.4%) had ST depression that may have been true ST depression or reciprocal changes. 120 patients had other ECG changes, including T-wave abnormalities (n=66; 25.7%), poor R-wave progression (n=16; 6.3%), atrial fibrillation (n=12; 4.7%), bundle branch block (n=4; 1.5%), frequent premature ventricular contraction (n=2; 0.7%).

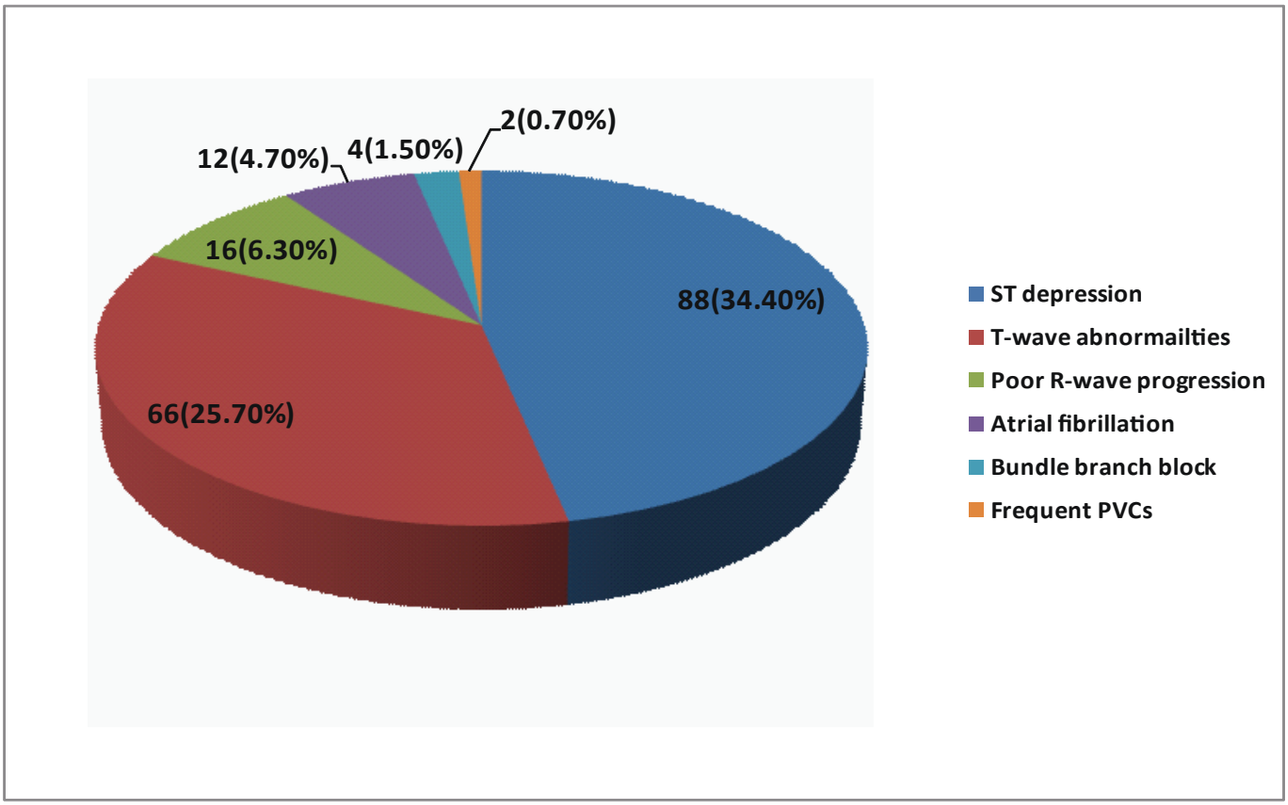

Fig-4: ECG changes in the corresponding lead in NSTEMI patients

Table-I: Echocardiographic and CAG findings

	Title	STEMI, n (%)	NSTEMI, n (%)	P value
Wall motion on echocardiography	No RWMA	08 (3.9)	88 (34.4)	0.0045
	Hypokinesia	32 (15.5)	94 (36.7)	
	Akinesia	152 (73.8)	62 (24.2)	
	Dyskinesia	14 (6.8)	12 (04.7)	
LV function on echocardiography	Fair (≥55 %)	26 (12.6)	106 (41.4)	0.0040
	Mild (45-54 %)	61 (29.6)	78 (30.5)	
	Moderate (31-44 %)	76 (36.9)	42 (16.4)	
	Severe (≤30%)	43 (20.9)	30 (11.7)	
Culprit Lesion	RCA	84 (40.4)	72 (28.1)	<0.0010
	LAD	114 (54.8)	104 (40.6)	
	LCx	10 (4.7)	72 (28.1)	
	LM	0 (0.0)	8 (3.2)	

On echocardiographs, NSTEMI patients had limited regional wall-motion abnormality (p=0.0045) compared to STEMI. Coronary angiography revealed that the left anterior descending (LAD) artery was the most commonly involved in both STEMI (54.8%) and NSTEMI patients (40.6%); however, the left circumflex (LCx) artery played a more important role in NSTEMI than in STEMI patients (28.1% vs 4.7%; p<0.001). With regard to short-term outcome heart failure, cardiogenic shock, arrhythmias, re-infarction and death were more in STEMI patients and it was statistically significance (Table-II).

Table-II: Short term outcome after MI

Outcome	STEMI, n (%)	NSTEMI, n (%)	P value
Heart failure	75 (36%)	24 (9.3%)	0.001
Atrial fibrillation	15 (7.2%)	2 (0.78%)	
Cardiogenic shock	35 (16.8%)	40 (15.6%)	
Supraventricular Tachycardia	5 (2.4%)	0 (0%)	
Ventricular Tachycardia	6 (2.8%)	0 (0%)	
Post infarct angina	12 (5.7%)	38 (14.84%)	
Re infarction	7 (3.3%)	2 (0.78%)	
Death	5 (2.4%)	1 (0.40%)	

Discussion

In this study, the mean age of STEMI and NSTEMI groups were 54.36±10.18 and 51.29±11 years respectively with an age range from 40 to 78 years. Majority of STEMI patients were found in 51 to 60 years of age but NSTEMI patients were mostly above 70 years. Burazeri et al[6] found that mean age of the study subjects with STEMI was 59.1±8.7 years in their study. In STEMI group male and female ratio was (4:1). In non STEMI group male and female ratio was (3:1.9).

In NSTE-MI patients complaints of retro sternal chest pain associated with other symptoms such as dyspnoea, nausea, abdominal pain, and syncope. However, atypical presentations are not uncommon[7]. These include stabbing chest pain, increasing dyspnoea, epigastric pain, indigestion. Atypical complaints are often observed in older patients over 75 years, in women, and in patients with diabetes, chronic kidney diseases, or dementia[8,9]. In this study, most of NSTEMI patients presented with atypical central chest pain, abdominal pain, nausea, vomiting, sweating.

Patients who were treated with early revascularization having low (2.5%) risk for development of life-threatening arrhythmias with 80% occurring during the first 12 hours after onset of symptoms[10]. In this study, ST elevation was seen in all STEMI subjects and ST depression was observed in 53.2% subjects with NSTEMI. Arrythmia including atrial fibrillation, supraventricular tachycardia, ventricular tachycardia were 12.4.% and 2% in STEMI and NSTEMI respectively. Most common echocardiographic findings of the subjects were regional wall motion abnormalities. Majority of the STEMI patients had LV dysfunction. Only 12.6% in STEMI and 41.4% in non STEMI had

>55% LV function. Coronary angiography revealed that the left anterior descending (LAD) artery was the most commonly involved artery in both STEMI (54.8%) and NSTEMI patients (40.6%); but, the left circumflex (LCx) artery played a more important role in NSTEMI (28.1%) than in STEMI patients (4.7%; p<0.001). This result is consistent with Chun et al study[11]. Recurrent post infarct angina occur in NSTEMI about 14.84% patients in this study. Effective early revascularization is beneficial for all STEMI patients. Randomized clinical trials have compared conservative treatment with invasive treatments in NSTE-ACS which shows that an invasive procedure reduced the incidence of myocardial infarction but not death[12,13,14].

In this study, 5 patients died in STEMI and 1 in NSTEMI. STEMI patients had higher hospital mortality rate than NSTE-ACS (7% vs 3–5%, respectively), but at 6 months mortality rates were nearly similar in both conditions (12% and 13%, respectively)[15-17]. Long-term follow-up showed that death rates were higher among NSTE-ACS patients than with STE-ACS, with a two-fold difference at 4 years[18]. This difference in mid-term and long-term evolution may be due to different patient profiles as NSTE-ACS patients were mostly older, having multiple co-morbidities, especially diabetes and renal failure. Similar study was also carried out in Bangladesh, the result of which was also consistent with this one[19].

Limitations

This was a retrospective study of patients with a discharge diagnosis of STEMI or NSTEMI. In clinical practice, most of STEMI patients were managed by primary PCI who presented earlier, while NSTE-ACS patients received less coronary intervention. Patients enrolled in the study came from a single hospital. A regional, or even national, study should be undertaken before the results can be extrapolated to the general population.

Conclusion

At the end, it is evident that short term clinical outcome of STEMI is worse than NSTEMI. STEMI patients had higher mortality rate from acute complications within 6 months, whereas the mortality rate of NSTE-ACS patients were higher after 6 months. So, in clinical practice this suggests that, STEMI patients should be early revascularized to reduce mortality or morbidity. On the other hand, as most of NSTE-ACS patients are older and have multiple co-morbidities, so they should be counseled to increase medication adherence for secondary prevention of ischemic heart disease.

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