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"Clinical Characteristics And Outcomes Of Percutaneous Coronary Intervention In Acute ST Elevation MI: A Study In AFC Fortis Escort Heart Institute, Khulna, Bangladesh"

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ABSTRACT: Background: Percutaneous coronary intervention (PCI) is an emergent percutaneous catheter intervention in the setting of ST-segment elevations myocardial infarction (STEMI), without previous fibrinolytic treatment. Primary Percutaneous Coronary Intervention has emerged as the therapy of choice in STEMI and selected cases of Non-ST Elevation Myocardial Infarction (NSTEMI). As Percutaneous coronary intervention (PCI) enters its fourth decade of use, it is now the most commonly performed revascularization therapy worldwide. **Objective:** To find out the clinical Characteristics and outcomes of Percutaneous Coronary Intervention in ST Elevation Myocardial Infraction. **Methods:** In this retrospective study, performed at Cardiology department AFC Fortis Heart Institute, Khulna, Bangladesh. All patients who underwent PCI for STEMI from January 2018 to December 2019 were enrolled in this study. All the data were collected from hospital registry and cath lab records. **Results:** The Study showed that out of 175 patients who presented with STEMI, 74.5% were male with average age of 56.38 years. The mean time of presentation after onset of symptom/s was 17.5 hours. About 68% patients presented in less than 12 hours of symptoms onset, 21.7% presented at 12-24 hours of symptoms onset and 10.3% patients presented late. PCI was done in 88.5% of patients. Almost all patients (98.3%) underwent coronary artery stenting with drug eluting stents. Multivessel PCI during index procedure was done in 7 patients. TIMI III flow following PCI was achieved in 97% cases. Average LVEF at discharge was 44.73%. Among the traditional cardiovascular risk factors, smoking was the commonest. Nearly 50% of the patients smoked while 36% were hypertensive, 27.2% diabetic, 2.6% had known dyslipidemia and 3.6% had family history of MI. 88.4% of patients presented in Killip class I while 5.6% patients presented in Killip class IV. Anterior wall STEMI was commonest accounting for 53% followed by Inferior wall, 41.8%. Angiography revealed SVD in 36%, DVD in 32.3%, TVD in 28.1%. Left Main Coronary Artery involvement was seen in 5 cases and 1, Left Main angioplasty was done. There were 7 deaths, all after Primary PCI. In-hospital mortality rates for patients presenting with and without cardiogenic shock were 38.46% and 1.59% respectively. The overall mortality rate was 3.98%. **Conclusion:** This study has reemphasized that PCI is effective in the management of STEMI cases in Bangladesh with improving mortality rates and decreasing complications. Minimizing the delayed presentation after the onset of symptoms should be one of the prime focuses for effective management of STEMI.

Keywords: Coronary Artery Disease, Percutaneous Intervention, ST Elevation Myocardial Infarction.

I INTRODUCTION

Cardiovascular diseases (CVD) are the leading cause of death worldwide. Cardiovascular disease takes the lives of 17.7 million people each year, and estimated 31% of all deaths worldwide with over 75% of cardiovascular deaths occurring in low-income and middle-income countries (LMIC) [1]. Acute ST-segment elevation myocardial infarction is the most dramatic manifestation of coronary artery disease (CAD) with high morbidity and mortality.Approximately 40 to 50% of patients with STEMI have multivascular coronary artery disease (CAD) [2]. Cardiovascular diseases (CVD) is one of the

leading causes of mortality worldwide with increasing incidence in developing countries like Bangladesh.Cardiovascular disease takes the lives of 17.7 million people each year, and estimated 31% of all deaths worldwide with over 75% of cardiovascular deaths occurring in low-income and middle-income countries (LMIC) [3, 4]. During recent decades, Bangladesh has experienced a rapid epidemiological transition from communicable to non-communicable diseases [3]. Of these, being the fourth leading cause of death in Bangladesh, ischemic heart disease claimed 50,700 deaths in 2012 [4].Timely primary percutaneous coronary intervention has become the optimal strategy for the treatment of STEMI [5], and achieves rapid and more consistent reperfusion with low complication rate when compared to thrombolysis [6].IHD may present as stable IHD or Acute coronary syndromes (ACS). Among the ACS, the mortality rate is highest for ST Elevation Myocardial Infarction (STEMI) [5]. Primary PCI is defined as intervention of the infarct related artery within 12 hour after the onset of symptoms, without prior thrombolytic therapy [5]. Primary Percutaneous Coronary Intervention has emerged as the therapy of choice in STEMI and selected cases of Non-ST Elevation Myocardial Infarction (NSTEMI) [5-8]. Optimal treatment of STEMI in developed and most of developing countries is based on the establishing of networks between regional primary PCI capable hospitals connected by an efficient ambulance service.As Percutaneous coronary intervention (PCI) enters its fourth decade of use, it is now the most commonly performed revascularization therapy worldwide. With the development of drug-eluting stents, clinical outcomes have improved significantly.The prevalence of cardiovascular disease is expected to rise and as a result, will pose a significant challenge and burden to the local health system. Previous cardiovascular studies have shown that elderly patients were less likely to receive evidence-based therapies and had higher mortality rate [17,19].There was also marked variation in the clinical care of the elderly with acute coronary syndromes (ACS) [17,18]. In addition, limited data are available on the delivery of health care and clinical outcomes of elderly patients with cardiovascular disease in the South-East Asia region. We therefore sought to evaluate the clinical characteristics and in-hospital outcomes of our cohort of elderly South-East Asian patients undergoing primary percutaneous coronary intervention (PPCI) for ST-elevation myocardial infarction (STEMI) in “real world” clinical practice. The main guidelines on the treatment of STEMI have discouraged PCI of arteries not responsible for AMI. According to ESC Guidelines for the Management of Acute Myocardial Infarction in Patients Presenting with ST-Segment Elevation [23], published in 2012 by the European Society of Cardiology, there is no evidence for emergency intervention in lesions which are not responsible for AMI.The aim of this study the Clinical Characteristics and Outcomes of Percutaneous Coronary Intervention in ST Elevation MI in AFC Fortis Heart Institute, Khulna, Bangladesh.

II METHODS

In this retrospective study, performed at Cardiology department AFC Fortis Heart Institute, Khulna, Bangladesh. All patients who underwent PCI for STEMI from January 2018 to December 2019 were enrolled in this study. All the data were collected from hospital records and cath lab records. Two cardiac interventionists who were trained in interventional cardiology performed all procedures. Evidence of ongoing ischemia 1-24 hours after symptom onset in Inclusion criteria. All patients presenting with Acute STEMI were counseled about the treatment modalities in emergency (ER). Almost all patients presenting with STEMI were taken for Primary PCI if indicated. Those who did not give written informed consent for Primary PCI or chose medical management or thrombolysis were excluded from this study. Those patients presenting late were taken for elective PCI after hospital admission. For Primary PCI, patients were given loading doses of Asprin (300 mg),Ticagrelor (180mg) and Rosuvastatin (20 mg) at ER. At cath lab, access for PCI was determined by the primary operator. Most of the cases were successfully performed via radial approach. Intravenous IV Unfractionated Heparin 10000 units was given after diagnostic CAG to maintain ACT of more than 300 seconds during procedure. Temporary pacemaker was inserted via femoral route whenever indicated. Thrombosuction was done in cases with high thrombus burden. Predilatation with a non-complaint balloon was done for most of the cases followed by stenting. Only Drug Eluting Stents (DES) was used. In cases where stenting was not feasible, plain balloon angioplasty was done. Post dilatation with a non-compliant balloon was done as a routine unless stents were deployed with high pressure with no obvious unexpanded stent struts were visible. After PCI, all patients were transferred to cardiac care unit (CCU). All data

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analyses windows SPSS version 20.0.

III RESULTS

The Study showed that out of 175 patients who presented with STEMI, 74.5% were male with average age of 56.38 years with youngest patient being 21 years old and oldest being 85 years old. About 12% (28) were less than 40 years of age. Most of the patients were male (68%). About 68% patients presented in less than 12 hours of symptoms onset, 21.7% presented at 12-24 hours of symptoms onset and 10.3% patients presented late. Primary PCI was done in 88.5% of patients. Almost all patients (98.3%) underwent coronary artery stenting with drug eluting stents. MultivesselPCI during index procedure was done in 7 patients. TIMI III flow following PCI was achieved in 97% cases. Average LVEF at discharge was 44.73%. Among the traditional cardiovascular risk factors, smoking was the commonest. Nearly 50% of the patients smoked while 36% were hypertensive, 27.2% diabetic, 2.6% had known dyslipidemia and 3.6% had family history of MI. 88.4% of patients presented in Killip class I while 5.6% patients presented in Killip class IV. Anterior wall STEMI was commonest accounting for 53% followed by Inferior wall, 41.8%. Angiography revealed SVD in 36%, DVD in 32.3%, TVD in 28.1%. Left Main Coronary Artery involvement was seen in 5 cases and 1, Left Main angioplasty was done.

Table 1: Baseline Characteristics, Diagnosis and Management Strategies.

Age (years)	56.38±12.98
Sex	
Male	119 (68.0%)
Female	56 (32.0%)
Duration of symptom/s	17.5 hrs (15min-7days)
Less than 12 hours	112 (68%)
12 to 24 hours	38 (21.7%)
More than 24 hours	25 (10.3%)
Risk factors	
Diabetes Mellitus	28.2%
Hypertension	35%
Smoking	50.4%
Dyslipidemia	2.6%
Family h/o of CAD	3.6%
Presenting symptom/s:	
Chest pain	97%
Shortness of breath	20%
Nausea/vomiting	28%
Abdominal pain	7.5%
Near syncope/syncope	6%
Killip class	
Class I	88.4%
Class II	5%
Class III	1%
Class IV	5.6%
Diagnosis:	
Anterior wall STEMI	53%
Inferior wall STEMI	41.8%
Posterior wall STEMI	3.4%

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Lateral wall STEMI	1.7%
Procedure:	
Primary PCI (PPCI)	155 (88.5%)
Elective PCI	20 (11.5%)
LVEF at discharge	44.73%
Duration of hospital stay (days)	7.6

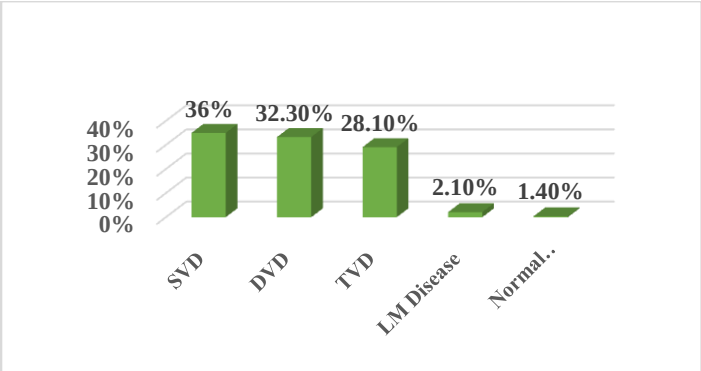

Fig -1: Diagnosis by Number of Vessels Involved.

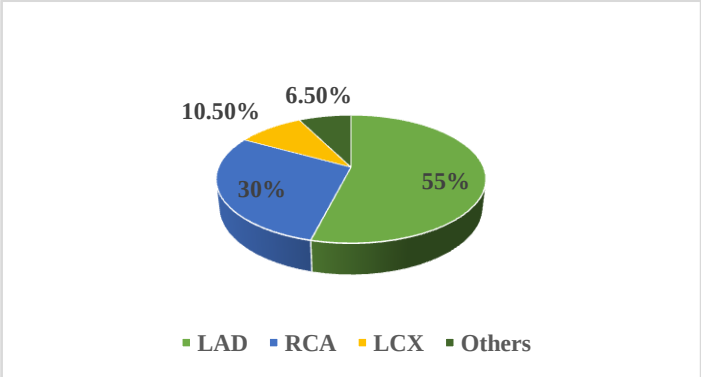

Fig -2: Culprit Vessel for STEMI.

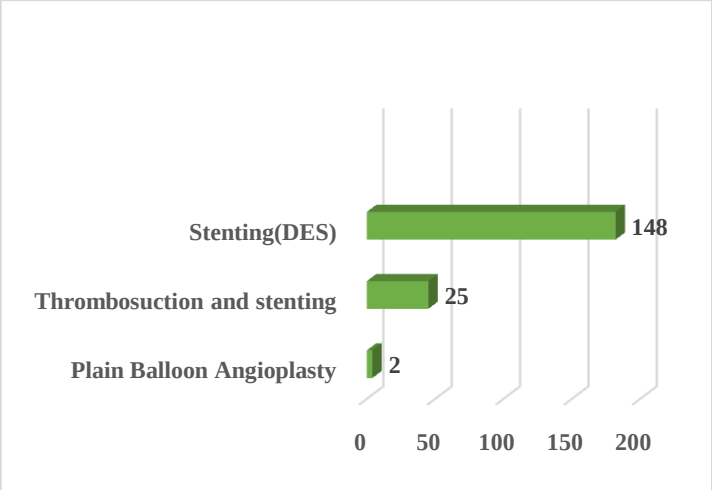

Fig -3: Types of Coronary Intervention.

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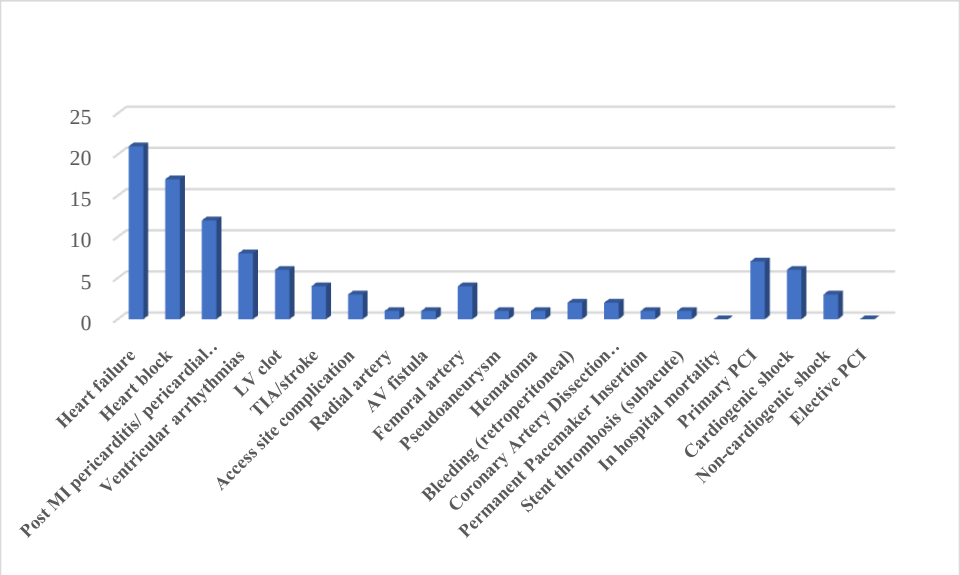

Fig.-4: Complications and In-Hospital Mortality Rates after PCI.

In all cases, wire could be crossed over the lesion. Only 4 cases out of 175 cases underwent plain balloon angioplasty due to the nature of lesion and vessels. While in all other cases, except for 1 patient with normal coronary arteries, DES was deployed. Thrombosuction because of excess thrombus burden was done in 25(14.2%) cases. TIMI III flow was reestablished in 97% cases and TIMI II in 3% cases. There were total of 7 deaths all during or after Primary PCI. 13 patients presented in cardiogenic shock, out of which 5 died. The commonest complication after PPCI was heart failure, occurring in 20 cases. The second most common complication was heart block requiring temporary pacemaker insertion in 18 cases. 1 patient needed a permanent pacemaker for persistent complete heart block. Post MI pericarditis/pericardial effusion developed in 11 patients, all of which resolved with conservative management. 3 patients developed access site complications in the forms of hematoma, AV fistula and pseudoaneurysm respectively. There were 4 cases of Transient ischemic stroke after PPCI, all the patients recovered their neurological function. VT/VF was encountered in 9 cases during hospital stay. 6 patients had developed LV apical clot in follow up, all had anterior wall MI. There were 2 cases of coronary artery dissection caused by guiding catheter which were managed immediately with stenting. 1 patient presented with sub-acute stent thrombosis in follow up. Acute Kidney Injury (Pre-renal and Contrast Induced Nephropathy) was seen in 11 cases (4.7%) but none of the patients required hemodialysis after PPCI. Average hospital stay was 7.6 days. Average LVEF at discharge was 44.73%.

IV DISCUSSION

ST-segment elevation myocardial infarction (STEMI) is the term cardiologists use to describe a classic heart attack. It is one type of myocardial infarction in which a part of the heart muscle (myocardium) has died due to the obstruction of blood supply to the area [9]. If ST elevation myocardial infarction is present, the decision must be made quickly as to whether the patient should be treated with thrombolysis or with primary percutaneous coronary intervention. Primary percutaneous coronary intervention targets early intervention, achieving better outcomes for patients suffering from ST elevation myocardial infarction primary percutaneous coronary intervention is the most commonly performed revascularization method among cardiac patients [10]. PCI was a therapeutic option far from reach to general population till recent past in our country. But now, with the development of health infrastructures, trained manpower and health awareness among the general population, it has become feasible for most of the patients in the country. In our study, all patients were taken for PPCI rather than thrombolysis because of the superiority in outcomes with PPCI. In this study, average age of patients was 56.38 years. This finding is similar to the previous studies done in Nepal [21, 22]. About 12% of cases were below 40 years of age, youngest patient being 21 years of

age. As with other studies, STEMI was more common in males (74.5%). The traditional cardiovascular risk factors like hypertension, diabetes and smoking were dominant in our country as well. The percentage of patients diagnosed as hypertensive was lower (35%) than other studies in our country. The percentage of diabetes (28.2%) was similar to other studies. While 50% of our patients were current or former smoker, this varied from 34% to 76.47% in other studies [9, 10, 11]. One of the major determinants of outcome in MI is the time interval between onsets of symptom to revascularization. In our study, the average time of presentation was 17.5 hours after the symptom onset. While the average time for patients taken for PPCI was 7.6 hours. In the previous study, this was about 8 hours [11]. Our study showed that nearly 21.7% of our patients presented after 12 hours of symptoms onset. The reasons for this may be due to delay in diagnosis, the time lost during referral from non-PCI capable centres, time delay in transport which is inevitable owing to the poor infrastructure and geographical condition of the country and lack of awareness in general population about the benefits of early revascularization in STEMI. Of these 34% patients, 21% patients underwent PPCI, as per recommendations in guidelines [12]. Anterior wall STEMI was commonest accounting for 53% followed by Inferior wall, 41.81%. 13 patients (5.6%) had presented in cardiogenic shock. LAD was the commonest culprit vessel as in other studies. Multivessel disease was present in 64.6% cases, consistent with international data [13]. Radial artery was preferred choice of vascular access for PPCI i.e nearly 88.5%. This was in vast contrast to previous study performed in our centre in which only femoral access was used [11]. Radial access was associated with lower access site complications, more patient comfort after the procedure and early mobilization. In all cases, wire could be crossed over the lesion. Only 4 cases out of 175 cases underwent plain balloon angioplasty due to the nature of lesion and vessels. While in all other cases, except for 1 patient with normal coronary arteries, DES was deployed. Thrombosuction because of excess thrombus burden was done in 25(14.2%) cases. TIMI III flow was reestablished in 97% cases and TIMI II in 3% cases. There were total of 7 deaths all during or after Primary PCI. 13 patients presented in cardiogenic shock, out of which 5 died. The commonest complication after PPCI was heart failure, occurring in 20 cases. The second most common complication was heart block requiring temporary pacemaker insertion in 18 cases. 1 patient needed a permanent pacemaker for persistent complete heart block. Post MI pericarditis/pericardial effusion developed in 11 patients, all of which resolved with conservative management. 3 patients developed access site complications in the forms of hematoma, AV fistula and pseudoaneurysm respectively. There were 4 cases of Transient ischemic stroke after PPCI, all the patients recovered their neurological function. VT/VF was encountered in 9 cases during hospital stay. 6 patients had developed LV apical clot in follow up, all had anterior wall MI. Only 1 patient had developed AV fistula in radial group while 1 patient had groin site hematoma, 1 had femoral artery pseudoaneurysm and 2 had retroperitoneal bleed in femoral access group. There were 7 mortalities, all in Primary PCI group. In-hospital mortality rates for patients presenting with and without cardiogenic shock were 38.46% and 1.59% respectively. The overall mortality rate was 3.98%. The mortality rate in patients without cardiogenic shock and overall mortality rate are similar to the studies conducted in India [14, 15], and international registry [16, 17].

V CONCLUSION

This study has reemphasized that PCI is effective in the management of STEMI cases in Bangladesh with improving mortality rates and decreasing complications. Minimizing the delayed presentation after the onset of symptoms should be one of the prime focuses for effective management of STEMI.

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