PROCEDURAL OUTCOME OF PRIMARY PCI INST-SEGMENT ELEVATION MYOCARDIAL INFARCTION AT AFIC & NIHD RAWALPINDI – PAKISTAN

Naseer Ahmad Samore, Shahid Abbas, Khurram Shahzad, Sohail Aziz, Muhammad Qaiser Khan, Abdul Hameed Siddiqui, Muhammad Nadir Khan, Syed Mohammad Imran Majeed

Armed Forces Institute of Cardiology & National Institute of Heart Diseases, Rawalpindi

ABSTRACT

Objective: To determine the procedural outcome of primary percutaneous coronary interventions (PCI) in ST segment elevation myocardial infarction.

Study Design: A quasi-experimental study.

Place and Duration: Armed Forces Institute of Cardiology & National Institute of Heart Diseases, a tertiary care cardiac institute from November 2011 to September 2013.

Materials and methods: Total 228 patients who underwent primary percutaneous intervention (primary PCI) were included in this study. A pre designed performa was prospectively filled which included demographic and procedural variables. Procedural success and in hospital mortality were recorded.

Results: The mean age was 59 ± 10.88 years. There were 205 (89.9%) males, 80 (35.1%) patients were found to be diabetic, 47 (20.6%) hypertensive, and 90 (39.5%) patients were smokers. Family history of ischemic heart disease was positive in 51 (22.4) patients. Anterior, inferior and lateral myocardial infarction were present in 137 (60.1%), 90 (39.5%) and 1 (0.4%) patients respectively. The Median time from the onset of symptoms to the arrival in the hospital was 122.5 ± 142.57 and median door to balloon time was 60 ± 22.88 min. Left anterior descending (LAD) was the commonest infarct related artery accounting for culprit artery in 138 (60.5%) followed by right coronary artery (RCA) & left circumflex artery (LCX) in 72 (31.6%) and 18 (7.9%) cases respectively. Procedural success was achieved in 222 (97.4%) patients. Six (2.6%) patients died in the hospital.

Conclusion: High success rate with low mortality rates can be achieved in our set up. However more studies and long term follow up is required to validate our results.

INTRODUCTION

World wide, coronary artery disease (CAD) is the single most frequent cause of death and half of these cases occur in Asia[1,2]. It is of increasing concern in low and middle income countries as risk factors such as smoking and obesity are becoming more common[1]. Myocardial infarction (MI) is generally the result of acute rupture or ulceration of an atherosclerotic plaque in a major epicardial coronary artery causing platelet activation and thrombosis resulting in occlusion of the vessel and infarction of the subjacent myocardium[3].

Primary percutaneous coronary intervention (PCI) is an emergent percutaneous catheter intervention in the setting of ST segment elevation myocardial infarction (STEMI), without previous fibrinolytic treatment. It is the preferred reperfusion strategy in patients with STEMI, provided it can be performed expeditiously (i.e. within guideline-mandated times), by an experienced team, and regardless of whether the patient presents to a PCI-capable hospital[1]. Randomized clinical trials comparing timely primary PCI with in hospital fibrinolytic therapy in high-volume, experienced centers have repeatedly shown that primary PCI is superior to hospital fibrinolysis[4-10]. Primary angioplasty has not been commonly adopted in this part of the world and only a limited number of patients are offered this modality of treatment even when the patients are directly reporting to PCI capable centers. Similarly there is paucity of local data on the outcome of primary PCI from this part of the world. Primary PCI programme was initiated on regular basis at AFIC/NIHD Rawalpindi in 2011 during day time in the beginning but now had

Correspondence: Dr Naseer Ahmad Samore, AFIC/NIHD Rawalpindi.
Email:
Received: 05 Feb 2014; Accepted: 05 Mar 2014

been extended to off hours also. The purpose of this study was to determine the outcome of this life saving procedure at our center.

Table-1: Characteristics of patients undergoing primary percutaneous coronary interventions (PCI) for STEMI (ST segment elevation myocardial infarction) (n = 228)

Baseline Demographic and Clinical characteristics:	Number of cases (%)
Mean Age (years)	59 ± 10.88
Male (Gender)	205 (89.9)
Past Medical history:	
Hypertension	80 (35.1)
Diabetes Mellitus	47 (20.6)
Smoking	90 (39.5)
Family history of Coronary Artery Disease	51 (22.4)
PCI in the past	12 (5.3)
CABG in the past	10(4.4)
Admission characteristics:	
Cardiogenic shock	19 (8.3)
Left ventricular failure	12 (5.3)
Anterior myocardial infarction	137 (60.1)
Inferior myocardial infarction	90 (39.5)
Lateral myocardial infarction	1 (0.4)
Timing variables:	
Onset of pain to ER time (minutes) median	60
Door to balloon time (minutes) median	122.5
Glycoprotein IIb / IIIa inhibitors use:	
Started in emergency reception	0(0)
Started in cathetrization laboratory	228(100)

STBMI: ST-segment elevationmyocardial infarction
CAD: Coronary Artery Disease
ER: Emergency reception
Primary PCI: Percutaneous coronary Intervention

PATIENTS AND METHODS

A quasi-experimental study was carried out at Armed Forces Institute Cardiology & National Institute of Heart Diseases (AFIC/NIHD) from November 2011 to September 2013. Patients reporting to the emergency department of this hospital with acute ST segment elevation myocardial infarction (STEMI) were included in the study. Acute STEMI was diagnosed on the basis of history of chest pain of less than 12 hours duration with electrocardiographic evidence of ST segment elevation of > 1mm in 2 or more contiguous leads or new left bundle branch block. Patients withhistory of thrombolytic therapy and prior coronary angioplasty were excluded. Total 228 patients were included in the study through non-probability consecutive sampling. Written consent was obtained from all the cases either from the patient himself or the available next of kin in case the patient was unable to sign the consent form. All these patients underwent primary PCI as a mode of reperfusion according to set protocols. All patients received 300 mg aspirin, loading with 600 mg of Clopidogeral and an intravenous I/V bolus of unfractionated heparin at the dose of 70 IU/Kg body weight. Patients were shifted to catheterization laboratory. Right radial approach was used in

most of our study population. Angiography followed by primary PCI was performed according to set protocol of the hospital.

At the completion of procedure the patients were nursed in cardiac care unit (CCU) to coronary step down unit. These patients were

Table-2: Angiographic and procedural characteristics of patients undergoing primary percutaneous coronary interventions (PCI) for ST-segment elevation myocardial infarction (STEMI) (n = 228)

Access site:	N(%)
Radial approach	202 (88.6)
Femoral approach	26 (11.4)
Culprit vessel:	
Left anterior descending	138 (60.5)
Left circumflex	18 (7.9)
Right coronary artery	72 (31.6)
Multi vessel coronary artery disease	68 (29.8)
Visible thrombus	93 (40.8)
Thrombus aspiration	66 (28.9)
Stents used	218(95.6)
Plain old balloon angioplasty (POBA)	10 (4.4)
No reflow	10 (4.4)
Intra-Aortic Balloon Pump	5 (2.2)
TPM	5 (2.2)
Type of stent used:	
Drug eluting stents (DES)(In number of patients)	56 (24.6)
Bare metal stent (BMS) (In number of patients)	136 (59.6)
Procedural outcome	
Procedural success	222 (97.4)
Mortality	6 (2.6)

CAD: Coronary Artery Disease.
PCI: Percutaneous Coronary Intervention.

Glycoprotein IIb/IIIa inhibitors were given in the form of two I/V boluses per procedurally and as an intravenous infusion post procedurally to all patients in the absence of contraindications. Other medication, selection of stent, use of thrombectomy device, temporary pacemaker (TPM), intra-aortic balloon pump (IABP) and ventilatory support were left to the discretion of the operator. Coronary flow in the infarct related artery was assessed visually by the operator according to the TIMI grading system on a scale of 0 to 3 before and after the PCI. Procedural success of primary PCI was defined as achievement of vessel patency with TIMI 3 flow and residual stenosis of less than 20%.

observed indoor, generally for 48 to 72 hours before discharge.These patients were prescribed 300mg daily for the first month followed by 75 mg daily indefinitely and Clopidogeral 75 mg for 3 months in case of bare metal stents and for one year in case of drug eluting stents. A predesigned performa was to be prospectively filled by all the operators which contained the relevant demographic features, presenting features, ECG findings, clinical variables like cardiogenic shock (defined as a systolic blood pressure of < 90 mmHg or requirement of inotropes to maintain a SBP > 90 mmHg) and pulmonary edema, timing variables, procedural details and outcome. Time to presentation was

defined as time from the onset of symptoms to arrival in the hospital and door to balloon time was the time starting from arrival in the hospital to first balloon inflation during the procedure of percutaneous coronary intervention. The primary end point was procedural success and in-hospital mortality.

All the variables were entered into the statistical package for social sciences software, version 19 (SPSS) for statistical analysis. Descriptive statistics were computed and presented as means and standard deviations for quantitative variables like age, and median for non-Gaussian variables (onset of pain to ER and door to balloon time in minutes). Qualitative variables reported in percentages for the gender, hypertension, diabetes mellitus, cardiogenic shock, left ventricular failure, multi vessel disease, various procedural variables, procedural success and mortality.

RESULTS

This study comprised of 228 patients. Demographic features and clinical variables are shown in table-1. The mean age was 59 ± 10.88 years. There were 205 males (89.9%) and 23 (10.1%) females. Eighty (35.1%) patients were found to be diabetic, 47 (20.6%) hypertensive, and 90 (39.5%) patients were smokers. Family history of ischemic heart disease was positive in 51 (22.4) patients. Nineteen (8.3%) patients were having cardiogenic shock and left ventricular failure was found in 12 (5.3%) patients. Anterior, inferior and lateral myocardial infarction were present in 137 (60.1%), 90 (39.5%) and 1 (0.4%) patients respectively. The median time from the onset of symptoms to arrival in the hospital was 122.5 minutes and median door to balloon time was 60 minutes. Angiographic and procedural details are shown in Table 2. Radial approach was the commonest access site in 202 (88.6 %) patients and femoral approach was used in 22 (9.6%) patients. LAD was the commonest infarct related artery accounting for culprit artery in 138 (60.5%) followed by RCA & LCX in 72 (31.6%) and 18 (7.9%) casesrespectively. Multi vessel disease (defined as ≥ 50% stenosis in ≥ two epicardial arteries) was present in 68 (29.8%) patients of our study population. Visible thrombus was present in 93 (40.8%) cases, where as thrombectomy device was actually used in 66 (28.9%) patients. All the patients in the study population received GP IIbIIIa inhibitor. Angioplasty with stentig was done in 221 (96.9%) patients, whereas POBA only was done in 10 (4.4%) patients. Drug eluting stents (DES) were used in 56 (24.6%) and bare metal stents were deployed in 162 (71%) patients. Rhythm disturbances were observed in 14 (6.1%) and TPM was inserted in 5 (2.2%) patients. No reflow was noticed in 10 (4.4%) patients and managed accordingly. Intra-aortic balloon pump was used in 5 (2.2%) patients. Procedural success was achieved in 222 (97.4%) patients. Six (2.6%) patients died in the hospital.

DISCUSSION

This study was done to determine the procedural success and in hospital mortality of primary percutaneous coronary intervention in patients presenting with acute ST segment elevation myocardial infarction, to the emergency department of this tertiary care cardiac institute. The mean age of our study population was 59 years. Previous studies from this part of the world had shown by and large similar age group suffering from STEMI[11-13]. However the mean age for STEMI patients reported in the studies conducted in the western countries was older[15-17]. Majority of the patients were male in this study cohort. Although many previous studies had shown male preponderance, but in our study almost 90% patients were males in contrast to around 70 to 80% in the most of other studies. Entitlement of a large number of serving and retired military and civilian males was an important factor to such an out of proportion male preponderance in this study cohort. Hafeez et al from the same center reported mean age of patient. Its suffering from acute ST segment elevation as 58 ± 11 years and 78% of their patients were males. About one third of our patients were diabetic, little less than half were hypertensive and another one third were smokers

and these results were consistent with the results shown in other regional and international studies[12-17]. Anterior myocardial infarction (MI) was the commonest infarction observed in our study population followed by inferior MI like it was observed in other local and international studies. Median time from onset of symptoms to presentation was about two hours. Arshad et al showed a median presenting time since the onset of symptomsof 3.8 hours ranging from 2 to 8.5 hours[18]. Median door to balloon time was one hour in our cohort. Such an ideal door to balloon time was achieved primarily due to our robust protocols, close vicinity of catheterization laboratory to the emergency department and round the clock available staff. Farman et al had observed a mean door to balloon time of 98.4 minutes[14]. Menees et al analyzed door-to-balloon times using data from 96,738 admissions for patients undergoing primary PCI for ST-segment elevation myocardial infarction from July 2005 through June 2009 at 515 hospitals and found median door-to-balloon times varying from 83 minutes in the first year to 67 minutes in the last year of study[19]. Current joint clinical practice guidelines of the American College of Cardiology and the American Heart Association (ACC–AHA) endorse a door-to-balloon time of 90 minutes or less as the goal, giving it a Class I (highest level) recommendation[4]. Because of this recommendation, door-to-balloon time has become the focus of quality-improvement initiatives. LAD was the commonest infarct related artery accounting for about 60.5% of the cases in this study the population followed by RCA in about 31.6% and LCX 7.9%. Similar incidence of culprit artery was found by the other investigators[14]. Procedural success for primary PCI was 97.4% in this study. Hussain et al from the same centerdemonstrated procedural success rate of 97.1%[20]. Similar rates have been quoted byJafary et al (97.1%), Farman et al (98.2%), Shaikh et al (97%), and Arshad et al (98.1%) from public and private sector hospitals in Karachi[12-14,18].

Jafary et al quoted inhospital mortality of 8.3% (43.9% in cardiogenic shock, 2.1% in non-shock patients). Hussain et al[12] from the same center documented 2.9% mortality[20].

CONCLUSION

We conclude that primary PCI for patients presenting with acute ST segment elevation myocardial infarction is a safe and effective mode of revascularization with high success rate and low mortality. Therefore primary PCI should be offered to more and more patients in the presence of required facilities.

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