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Outcome of Primary Percutaneous Coronary Intervention in Ibrahim Cardiac Hospital & Research Institute

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ORIGINAL ARTICLE

ABSTRACT

Objective: To determine the outcome of primary percutaneous coronary intervention (PPCI) in Ibrahim Cardiac Hospital & Research Institute.

Methods: Medical records of 66 consecutive patients presented in our hospital between January 2010 toJune,2011 with acute ST elevation myocardial infarction (STEMI) and were treated with primary PCI as a mode of reperfusion were reviewed. The primary end point was in hospital mortality and secondary end points were 30 day mortality, myocardial infarction, recurrent angina and congestive cardiac failure, from discharge to one month follow up.

Results: The procedural success was 98.5%. One (1.5%) patient died during hospital stay .No mortality was observed in the 30 days follow up from discharge while other complications like recurrent angina and acute left ventricular failure were 1.5%.

Conclusions: Our findings suggest favorable outcomes, matching the international data can be achieved in our patients with primary PCI in the management of life threatening illness like STEMI despite all the limitations. Primary PCI as a preferred method of reperfusion strategy needs to be practiced more often in our part of the world.

Key words: Primary percutenous coronary intervention; STEMI; Reperfusion.

INTRODUCTION

Cardiovascular diseases, including myocardial infarction (MI) and heart failure, remains the leading cause of death in developed countries. It is of increasing concern in low and middle-income countries as risk factors like smoking and obesity are becoming more common in these countries.[1] Myocardial infarction is generally the result of acute rupture or ulceration of an atherosclerotic plaque in a major epicardial coronary artery. Exposure of the intimal layer initiates a cascade of platelet activation and thrombosis resulting in occlusion of the vessel and infarction of the subjacent myocardium.[2] The aim of acute treatment of ST elevation myocardial infarction (STEMI) is restoration of myocardial perfusion by recanalization of the occluded vessel.

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Early reperfusion is associated with better outcomes. Thrombolytic therapy and primary percutaneouscoronary intervention (PCI) are used as reperfusion strategies. Several randomized trials and meta-analyses have shown that primary PCI is superior to thrombolysis in the treatment of STEMI in terms of death, reinfarction, and stroke.[3]

Primary PCI is preferred if skilled interventional cardiologists and catheterization laboratories with surgical backup are available and if the procedure can be performed preferably within 90 minutes after initial medical contact with the patient.[4] Few studies from India including a study by Reddy et al concluded that primary angioplasty is safe and effective with high procedural success (99%) and lower rates of recurrent ischaemic events (5%).[5] But there are very few studies in Bangladesh with primary PCI. Selim[6] in his study of 40 acute STEMI patients showed that patients who received primary PCI had better in-hospital outcome in terms of ECG change, LVEF and complications in comparison to patient who received IV streptokinase as reperfusion therapy. This provides strong rationale to conduct such a study so as to determine the outcome of primary PCI in our population and to compare the same with international data.

Patients & Methods:

There were 66 patients presented to the Emergency Department of Cardiology, Ibrahim Cardiac Hospital & Research Institute, from January 2010 to June, 2011 were retrospectively reviewed. These patients presented with chest pain of <12 hours duration with electrocardiographic evidence of ST segment elevation of ≥1mm in >2 contiguous leads or new left bundle branch block without previous history of thrombolytic therapy, coronary angioplasty or coronary artery bypass grafting. All these patients underwent primary PCI as a mode of reperfusion, through femoral route.

All patients in Emergency Department received aspirin 300 mg, clopidogrel 600 mg and beta blockers as per indications and underwent-diagnostic angiogram followed by primary PCI of the infarct-related artery. Choice of stent and intracoronary epitifibatide use were at the judgment of the operators. Stent size selection was primarily based on visual assessment of lesion length and vessel diameter. All patients were prescribed aspirin 300 mg for 1 or 3 months and 75mg daily thereafter and clopidogrel 150mg daily for a minimum of 3 months for baremetal stent and one year for drug-eluting stent. Following PCI all patients initially remained in coronary care unit and later shifted to coronary step down unit before discharge. Routine follow up was done after two and four weeks of discharge.

A structured questionnaire was designed to collect information including, age, gender, history of diabetes (defined as a fasting glucose ≥126 mg/dl or on treatment), hyperlipidaemia (fasting cholesterol ≥200 mg/dl or on treatment), hypertension (blood pressure ≥140/90 mmHg or on treatment), smoking, left ventricular function (visually estimated, using either echocardiography or left ventriculography), presence of cardiogenic shock (defined as a systolic blood pressure of <90 mmHg or requirement of inotropes to maintain a SBP>90 mmHg). Angiographic and procedural details [culprit vessel, number of diseased vessels, use of stents, GP IIb/IIIa inhibitors and Thrombolysis in Myocardial Infarction (TIMI) flow] were also collected. Hospital records were reviewed for further information including need of intubation, laboratory data including haemoglobin, serum creatinine and cardiac enzymes etc.

Door-to-balloon time was estimated (the time from arrival at the hospital until balloon inflation in cardiac catheterization laboratory). Coronary flow in the infarct related artery was assessed visually by the operator and classified according to the TIMI grading system on a scale of 0 to 3 both before and after the PCI. PCI success was

defined as achievement of vessel patency to a residual <30%. Significant groin haematoma was defined as a haematoma>10cm in diameter or requiring transfusion.[21]

The primary end point was in-hospital mortality and secondary end points included 30 day outcomes from discharge which included mortality, reinfarction (defined as recurrence of clinical symptoms or new electrocardiographic changes)[21] and elevation of troponin I, recurrent angina (defined as any new episode of angina, with new electrocardiographic changes requiring readmission and initiation of a nitroglycerin infusion) and congestive heart failure (defined as a history of paroxysmal nocturnal dyspnoea, dyspnoea on exertion or pulmonary congestion on chest x-ray).[21]

All the variables were entered into the Statistical Package for Social Sciences (SPSS Inc) software, version 16 for data analysis. Descriptive statistics for continuous variables like age, LVEF and door-to-balloon time (in minutes) were presented as means and standard deviations. Categorical variables reported as frequencies and corresponding percentages for the gender, hypertension, diabetes mellitus, hyperlipidaemia, cardiogenic shock, left ventricular failure, multivessel diseases, procedural success, mortality and thirty day outcome variables like myocardial infarction, recurrent angina and congestive heart failure.

RESULTS

Over half (53%) of the patients was middle-aged (41-60 years), 30.3% elderly (≥60 years old) and 16.7% young and early middle-aged (20-40 years) with mean age of the patients being 53.4 ± 11.7 years. There were 55(83.3%) males and 11(16.7%) females giving a male to female ratio of roughly 4:1 (Table I). The risk factors distribution show that over three-quarters (75.8%) of the patients had diabetes and 66.6% hypertension, 60.7% dyslipidaemia and 42.4% smoking habit (Table II). Nearly 60% had Inferior MI, 25.8% anterior MI and 15.1% anteroseptal MI (Fig.1). Double vessel disease was the most commonly identified culprit vessel (40.9%) followed by SVD (34.8%) and TVD (24.3%) (Table III). In half of the patients the door-to-balloon (D2B) time was 15-45 minutes with median door-to-balloon time being 46 minutes (Table IV).

TABLE I. Distribution of demographic characteristics

Demographic characteristics	Frequency	Percentage
Age*(yrs)		
20-40	11	16.7
41-60	35	53.0
≥ 61	20	30.3
Sex		
Male	55	83.3
Female	11	16.7

Mean age = 53.4 ± 11.7 years.

TABLE II. Distribution of risk factors among patients

Risk factors	Frequency	Percentage
Smoking	28	42.4
Hypertension	44	66.6
Dyslipidemia	40	60.7
Diabetes mellitus	50	75.8

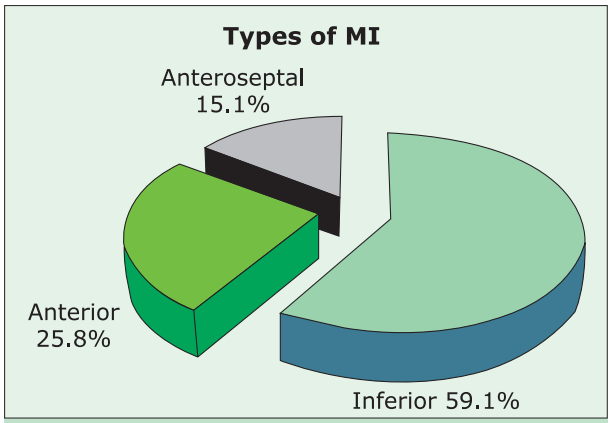

FIGURE 1: *Distribution according of type of MI*

TABLE III. Distribution of number of coronary artery involvement

Coronary involvement	Frequency	Percentage
Single vessel disease	23	34.8
Double vessel disease	27	40.9
Triple vessel disease	16	24.3

TABLE IV. Distribution of D2B time (minute)

D2B time (minute)	Frequency	Percentage
15-45	33	50.0
46-75	21	31.7
76-90	10	15.1
≥ 91	2	3.2

Stents were deployed in 91% patients and multivessel PCI was performed in 8.7% patients. Procedure was successful in 98.5% of the cases. One (1.5%) patient was referred for urgent surgical revascularization. The complications developed were groin haematoma(4.5%), arrhythmia (3%), cardiogenic shock (4.5%)and acute left ventricular failure (1.5%). One (1.5%) patient died in the hospital following cardiogenic shock. Post discharge 30-day outcomes of the studied cohort reported no death. Major complications during one month follow up were unstable angina (1.5%) and acute left ventricular failure (1.5%).

DISCUSSION

Our study showed an excellent procedural success rate (98.5%) with an excellent overall in-hospital survival rate (98.5%). One patient out of 66 patients died (1.5%) which is lower than that observed in international data which showed in-hospital mortality of 5.2% in second national registry of myocardial infarction (NRMI2)[7] and 3% in ASSENT 4 trial.[8] The low mortality in our study could be due to chance because of small sample size or mortality may have really fallen since the NRMI2 study conducted in 1998. In our study 3(4.5%) patients had cardiogenic shock; of them 1(1.5%) died which is again much lower than international data.

Studies from India by Reddy et al.[5] showed an in-hospital mortality of 2.2% in non-cardiogenic shock group. Outcomes were observed in a JCIA certified local study with mortality of 43.9% and 2.1% in patients undergoing primary angioplasty for STEMI with and without cardiogenic shock respectively.[11]

Door-to-balloon time is an important determinant of quality of care. Recommended time as per American College of Cardiology (ACC)/American Heart Association (AHA) guidelines is 90 minutes. In all of our patients the recommended door-to-balloon time was feasible to maintain and in half of the cases the door-to-balloon time was much lower than the recommended time. Only two patients' PCI were performed at 90 minutes. However, if we look at recent study by Zhang[12] conducted in China, the median door-to-balloon time reported for primary PCI was 132 min and only 22% of patients had PCI performed in <90 minutes.

Cardiologists had recognized the importance of early reperfusion in limiting ischaemic damage to the myocardium. First benefit identified with the use of thrombolytic therapy to achieve reperfusion was primarily due to two landmark large trials: the Second International Study of Infarct Survival Group (ISIS-2)[13] and an Italian group (GISSI).[14] Both trials studied the effects of intravenous streptokinase given to patients with suspected acute MI. The undoubted benefits of thrombolysis are offset by its nonspecificity for the coronary circulation resulting in risk of bleeding complications and time-dependent uncertainty about the efficacy of reperfusion. In addition, there is limited evidence of the benefit of thrombolytic therapy in a number of high-risk groups including older patients and in the context of cardiogenic shock.[15]

Percutaneous coronary intervention has potential benefits of specific and confirmed recanalization of the culprit vessel as well as knowledge of the detailed coronary anatomy. Clinical trials comparing the efficacy of thrombolysis and primary angioplasty have concluded that superior outcomes can be obtained with an invasive approach. A meta-analysis by Keeley et al, demonstrated that Primary PCI was better than thrombolytic therapy at reducing overall short-term death ($p=0.0002$), non-fatal reinfarction ($p<0.0001$), stroke ($p=0.0004$), and the combined endpoint of death, non-fatal reinfarction, and stroke ($p<0.0001$).[16]

A more recent evaluation of patients recruited into the PRAGUE-2 study found that, at 5 years after the procedure, the incidence of reinfarction, revascularization and death from all causes was considerably reduced in those patients randomized

to the PCI arm compared to thrombolytic arm with p value of 0.009, <0.001 and 0.06 respectively.[17] The possible risks associated with primary PCI includes bleeding, procedure related immediate complications and radiographic contrast related acute renal failure.[18]

Benefits of primary PCI in older patients has been addressed by several studies. GUSTO IIb trial found a reduced mortality associated with primary invasive approach when offered to patients >65 years old.[19] As PCI offers reduced rates of complications, early discharge from the hospital and lower readmission rate for cardiac event with consequent reduction in hospital and patient costs[20] can be ensured.

CONCLUSION

We conclude that with increasing awareness and the wider availability of primary angioplasty, this procedure will hopefully be performed more frequently and thrombolytic therapy will no more be the first choice therapy for treatment of STEMI in our setting.

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