Primary Percutaneous Coronary Intervention (PPCI) in Acute Myocardial Infarction Complicated by Cardiogenic Shock in a Newly Emerging Cardiac Centre in Nepal

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Abstract

Background: Acute myocardial infarction (AMI) is complicated by cardiogenic shock in 7-10% of patients. Mortality rate is exceedingly high and reaches 70-80% in those treated conservatively. Large thrombolytic trials demonstrate 60% mortality with most effective thrombolytic agent. In between September 2005 to August 2008 total PCI in Shahid gangalal National Heart Centre (SGNHC), Nepal was 452. among them primary PCI (PPCI) in AMI with cardilgenic shock was done in only 16 patients with cardiogenic shock who underwent PPCI, 6 patients are in out of 50% (n=8) patients with cardiogenic shock who underwent PPCI, 6 patients are in routine follow up over 12 months and 2 were doing well in subsequent 6 months but lost in follow up afterwards. Primary PCI in AMI complicated by cardiogenic shock has lower mortality and improved outcome. High cost, high in-hospital mortality, need for trained manpower are the major limitations.

Keywords : Primary Percutaneous coronary intervention, acute myocardial infarction, cardio genic shock, SGNHC (Shahid Gangalal National Heart Centre).

INTRODUCTION

Cardiogenic shock is the commonest cause of death in patients with acute myocardial infarction (AMI) who reach hospital alive. Cardilgenic shock in AMI occurs when 40% or more of the left ventricle is destroyed. It occurs within hours of onset of infarction due to massive ischemia and infarction. . A relataively small infarction superimoposted on extenxive previous damage may precipitate cardiogenic shock. Acute myocardial infarction is complicated by cardiogenic shock in 7-10 % of ptients. Mortality rate is exceedingly high and reaches 70-80% in those treated conservatively. Large thrombolytic trials demonstrate 60% mortality with most effective thrombolytic agent. Comparison of 30 day mortality in cardiogenic shock with AMI between Reteplase or Alteplase, 64% of patients treated with Repteplase and 58% treated with Alteplase died within 30 days (p=0.59).

A growing trend has been to go for more aggressive therapeutic interventions early in patients who have cardiogenic shock following acute myocardial infarction. In the recent guidelines of the European Society and American College of Cardiology (ACC) and the American Heart Association (AHA) recommend early mechanical revascularization for cardiogenic shock for patients younger than 75 years with ST-elevation AMI or left bundle-branch block.

Invasive strategy in developing country like Nepal is not only costly but also technically demanding. No study has been done till date with aggressive invasive strategy in poor developing country like Nepal and hence its usefulness, justification and feasibility is not known. The purpose of this study was to evaluate the in-hospital mortality rate in a cohort of unselected consecutive patients with AMI complicated by cardiogenic shock treated with PPCI in SGNHC, the only national heart centre which offers this facility in Nepal.

METHODS

Sixteen consecutive patients who presented to SGNHC with ST elevation MI complicated by cardiogenic shock were studied. Those patients who presented with ST elevation MI with cardiogenic shock and mechanical complications like papillary muscle rupture, ventricular septal defect and free wall rupture in echocardiography were not considered for PPCI due to surgical indication. We do not have exact data of the whole incidence of cardiogenic shock in ST elevation MI. however, it is estimated to be approximately 5-7%. Diagnosis of acute ST elevation with cardiogenic shock was defined as evidence of hypo-perfusion (cold clammy skin, cerebral obtundation), systolic blood pressure <90 mm Hg, pulse >100 bpm and evidence of acute STEMI or neew onset LBBB (ischemic chest pain and ST elevation in ECG).

This is a retrospective study between September 2005 to August 2008. Total PCI in SGNHC was done in 452 patients. Among them PPCI in AMI with cardiogenic shock was done in only 16 patients (3.5%).

RESULTS

Clinical characteristics of the patients included in this study are shown in table 1. the interval between AMI to Cardiogenic shock PPCI was 6-30 hours. The age range was between 21-77 yrs (mean 48.5+/16.52 yrs). There were 12 male and 4 female patients. The risk factors distribution showed diabetes in 4, smoking in 7, hypertension in 4 and strong family history in 2 patients. The baseline left ventricular ejection fraction (LVEF) by echocardiography was 30-41% (35.57 +/ 3.92). the culprit vessels were 7 right coronary arteries (RCA), 6 left anterior descending arteries (LAD), 2 left circumflex (LCX) and 1 left main vessel (LM). Thrombolysis in myocardial infarction (TIMI) flow among 16 patients showed pre procedure TIMI flow 0 in 14 patients ad TIMI flow 1 in 2 patients. Post procedural TIMI flow 3 was achieved in 13 patients. Intraaortic balloon pump (IABP) was used in 7 patients.

Table 1. Patient Characteristics	
Characteristics	n=16
Mean Age (years)	48.5 ± 16.5
Male Sex	12 (75%)
Anterior MI	7 (44%)
Non anterior MI	9 (56%)
Diabetes Mellitus	4 (25%)
Hypertension	4 (25%)
Current Smoking	7 (44%)
Hyperlipidemia	3(19%)
IABP usage	7 (44%)
LVEF	35.6 ± 3.9%

Among those 16 patients with acute ST elevation MI complicated by cardiogenic shock who underwent PPCI, 8 patients died in-hospital and 8 survived and were discharged. Of 8 deaths, culprit vessel could not be opened in 2 patients, 1 died due to pre existing renal failure and 5 patients died despite opening the culprit vessel due to ongoing ischemia. Of the 8 patients who are alive, 6 are in routine follow up over 12 months and 2 were in regular follow up for subsequent 6 months.

DISCUSSION

Meta analysis of 23 large randomized trial have shown that primary PCI is superior to thrombolysis for immediate treatment of STEMI due to more effective restoration of coronary patency, less recurrent myocardial ischemia, less coronary reocclusion, improved residual LV function and better clinical outcome including stroke.

The mortality in this study with 16 patients showed to be 50%. The causes of mortality were pre-existing renal failure, TIMI flow 0/1 and delayed procedural time.

The landmark Shock trial showed that early revascularization is better than medical management in AMI with cardiogenic shock. Thirty day survival was 54% and one year survival was 50%. Thirty day survival after successful PCI was 65% and after unsuccessful PCI was 20%. Mortality was related to TIMI flow. Mortality with TIMI grade flow showed TIMI 3 flow (mortality 98%) TIMI 2 flow (mortality 55%) and TIMI 1 or 0 flow (mortality 100%). The independent predictors of mortality in shock trial was increasing age, lower

systolic blood pressure, increasing age, lower systolic blood pressure, increasing time of randomization, lower post PCI TIMI flow 0/1, and multivessel PCI.

In a prospective randomized trial, 1333 patients at 80 centres in Germany between 1994 - 2001 in ALKK PCI registry 14.2% patients with AMI presented with cardiogenic shock. The in-hospital mortality was 46.1%. predictors of in-hospital mortality was ppost procedural TIMI flow, advanced age (75 years or more) and time-interval between symptom-onset and start of PCI.

In retrospective study between 1994 - 2004 in France, 175 patients presenting with AMI and cardiogenic shock the in-hospital mortality was reported to be 43%. Independent risk factors for increased mortality were absence of TIMI 3 flow, smoking, need of mechanical ventilation. The independent predictors of impaired long term outcome were LVEF<0.3, triple vessel disease.

In REO - SHOCK trial 30 day mortality was 42.5%. the national registry of myocardial infarction, Jan 1995 -May 2004 in 775 US hospitals showed in hospital mortality of 47.9%. patients randomized to aortic counterpulsation had significantly less reocclusion of the infarct-related artery during follow-up compared with control patients (8% versus 21%, P<0.03). in addition, there was a significantly lower event rate in patients assigned to aortic counterpulsation in terms of a composite clinical end point (death, stroke, reinfarction, need for emergency revascularization with angioplasty or bypass surgery, or recurrent ischemia: 13% versus 24%, p<.04). in a prospecctive observational study of 293, 633 patients from National registry of myocardial infarction, Jan 1995 - may 2004, 775 US hospitals: cardiogenic shock was present in 25,311 (8.6%) of patients. There was increase in PPCI rate from 27.4% to 54.5%. The in-hospital mortality in 1995 was 60.3% which was reduced in 2004 to 47.9%.

The in-hospital mortality of AMI complicated by carcinogenic shock in this study is high (50%). However, this is lower compared to historical thrombolytic therapy in AMI with cardiogenic shock. Our present study shows that invasive strategy can be alternative mode of treatment compared to thrombolytic therapy despite high mortality even in developing country like Nepal in highly selected patients.

STUDY LIMITATION

This is the only national heart centre in Nepal to start PCI service, hence in th initial phase the total number of routine PCI and primary PCI in cardiogenic shock is small. As this is a retrospective study of a single centre with small number of highly selective patients there is no direct control group with thrombolytic therapy. However, the number of patients admitted with AMI in hospital is small in number and among those only very small number of patientscomplicated by cardiogenic shock are admitted in hospital.

CONCLUSION

In-hospital mortality in patients with acute myocardial infarction complicated by cardiogenic shock remains high, even with early interventional therapy. Every effort should be made to reduce the incidence of cardiogenic shock. Primary PCI in AMI complicated by cardiogenic shock has lower mortality and improved outcome. High cost, high in-hospitalmortality, need for trained manpower are the major limitations.

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