Primary Percutaneous Coronary Intervention and changing trends in Acute STEMI Mortality

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Summary

Background: Thrombolysis and Primary Percutaneous Coronary Intervention (PPCI) are the standard treatment options for coronary reperfusion in acute ST elevation myocardial infarction (STEMI). We conducted the study to assess the influence of PPCI on the short and intermediate term mortality in acute STEMI, and to identify the high risk subsets that may benefit from PPCI in our population.

Methods: Consecutive acute ST elevation myocardial infarction patients admitted to Department of Cardiology, Medical College, Kottayam from November 2008 to March 2010 were allocated to thrombolysis or PPCI as per the standard indications and affordability. Primary endpoint analyzed was in-hospital mortality at 5 days. Secondary endpoints were mortality, angina, re-infarction and Left ventricular dysfunction at 1 month. Statistical analysis was done using chi-square analysis and student t test.

Results: 962 consecutive cases of acute STEMI eligible for either PPCI or thrombolysis were included in the study. 135 patients (14%) underwent PPCI and 827 (86%) were subjected to thrombolysis. 6.7% of the females patients underwent PPCI compared to 15.9% of the males (p=0.001). Mortality in PPCI group was 5.2% compared to 11.2% in thrombolysed group (p=0.032). Inferior wall with Right Ventricular MI had higher mortality than Anterior Wall MI (AWMI) (p=0.012). In the thrombolysed group those who presented within 6 hours of onset of pain had lower mortality (8%) compared to those who presented >6 hours (14.42%) (p=0.003). There was no difference in mortality in PPCI group in the above subsets (p=0.583). Mortality at 1 month was 1.4% in thrombolysed group while there was no mortality in PPCI group (p=0.163). Left ventricular dysfunction was present in 26.8% patients in thrombolysed group compared to 8.8% in PPCI group (p=<0.001).

Conclusion: Mortality in acute ST elevation myocardial infarction is higher in thrombolysed group than PPCI group. PPCI significantly reduces mortality in all subgroups studied. There is a statistical trend towards decrease in reinfarction and 1 month mortality in the PPCI group.

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Introduction

Myocardial infarction (MI) is emerging as the most common cause of death in the world. Thrombolysis and Percutaneous Coronary Intervention (PCI) are the standard treatment options for coronary reperfusion in Acute Myocardial Infarction (AMI). Primary angioplasty without antecedent thrombolytic therapy is an effective means of achieving coronary reperfusion in patients presenting with an AMI. Fast and efficient re-establishment of coronary blood flow is the primary aim in the treatment of STEMI. In patients with acute...
myocardial infarction, early treatment results in restoration of adequate blood flow through the infarct-related vessel, limitation of infarct size, preservation of left ventricular function, and reduction in mortality.

The first studies of fibrinolysis versus primary percutaneous coronary intervention (PPCI) included only patients admitted directly to hospitals with interventional facilities and demonstrated that PPCI reduced a composite end point of death, stroke, and reinfarction. Widespread adoption of PPCI was potentially limited by the anticipated delays associated with transfer of patients from noninvasive hospitals ("spokes") to centers with facilities for coronary intervention ("hubs").

Several uncontrolled studies have demonstrated a high rate of coronary reperfusion and beneficial effect on left ventricular function with PPCI. Prospective randomized studies comparing thrombolyis with primary angioplasty have demonstrated improved infarct artery patency, reduced recurrent ischemia and improved infarct-free survival during short-term follow-up in the angioplasty treated patients. Primary angioplasty has also been shown to reduce the incidence of stroke. Long-term outcomes, however, are less well documented with conflicting data suggesting either attenuation or enhancement of short-term results. Recent data have revealed that the ultimate goal of reperfusion therapy is not only artery patency but restoration of normal TIMI 3 coronary flow, which has been shown to correlate with reduced regional wall motion abnormalities and improved clinical outcome. To date, thrombolytic agents have been shown to restore TIMI 3 flow in only just over 50% of cases, well below that achieved with primary angioplasty. Recent trials and meta-analyses have produced increasing evidence that primary percutaneous coronary intervention produces better short and long-term outcomes for the treatment of acute myocardial infarction. This study was done to assess the feasibility of the same in our population.

**Aim**

Aim of the study was to assess the short and intermediate term mortality in acute STEMI, influence of primary PCI on the above and to identify high risk subsets that may benefit from primary PCI in our population.

**Methods**

Consecutive acute STEMI patients admitted to Department of Cardiology, Medical College, Kottayam from November 2008 to March 2010 were allocated to thrombolysis or primary PCI as per the standard indications and affordability. Primary endpoint analyzed was in-hospital mortality at 5 days. Patients were reviewed at 1 month. Secondary endpoints analysed were mortality, angina, re-infarction and left ventricular dysfunction as assessed by echo-cardiography at 1 month. (Fig.1)

**Statistical analysis**

Categorical variables were compared by chi-square analysis and continuous variables by Student t test. All p values are two tailed.

**Results**

Total 962 consecutive cases of acute STEMI eligible for either primary PCI (PPCI) or thrombolysis were included in the study. 768 patients (79.2%) were males and 194 (20.8%) were females. 135 patients (14%) underwent

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**Study Design**

Consecutive STEMI patients allocated to thrombolysis or primary PCI (n=962)

- PCI n=135
- Thrombolysis n=827

Primary endpoint
Inhospital mortality at 5 days

**Secondary endpoints**
- 1 month
- Mortality
- Angina
- Reinfarction
- LV dysfunction

Fig 1
PPCI and 827 (86%) were subjected to thrombolysis. 6.7% of female patients underwent PPCI compared to 15.9% in male (p=0.001). (Table.1)

Mortality in PPCI group was 5.2% compared to 11.2% in thrombolysed group (p=0.032) (Fig.2). So also, mortality in the thrombolysed group was higher in females (24%) compared to males (7%) (p=<0.001) (Fig.3). Inferior wall (IWMI) with Right Ventricular MI had higher mortality than Anterior Wall MI (AWMI) (p=0.012). In the thrombolysed group those who presented within 6 hours of onset of pain had lower mortality (8%) compared to those who presented >6 hours (14.42%) (p=0.003). There was no difference in mortality in PPCI group in the above subsets (p=0.583). (Fig.4).

31 patients in thrombolysed group and 1 patient in PPCI group developed reinfarction (p=0.07). Mortality at 1 month was 1.4% in thrombolysed group while there was no mortality in PPCI group (p=0.163). LV dysfunction was present in 26.8% patients in thrombolysed group compared to 8.8% in PPCI group (p=<0.001).

Recurrent angina was present in 40.5% patients in thrombolysed group compared to 2.9% in PPCI group (p=<0.001). (Fig.5)

**Discussion**

The early results of the PAMI trial demonstrated a significantly reduced incidence of recurrent ischemic events and a trend toward reduced mortality in the primary angioplasty group at 6 months. A quantitative review of 23 randomized trials comparing thrombolysis and primary PCI by Keeley and colleagues showed a significant reduction in death and reinfarction with PPCI. This finding was consistent with our study also.

Recent data have revealed that the ultimate goal of reperfusion therapy is not only artery patency but restoration of normal TIMI 3 coronary flow, which has been shown to correlate with reduced regional wall motion abnormalities and improved clinical outcome. To date, thrombolytic agents have been shown to restore TIMI 3 flow in only just over 50% of cases, well below that achieved with primary angioplasty.

In our study, in the thrombolysed group those who presented within 6 hours of onset of pain had lower mortality compared to those who presented >6 hours.
observation was seen in previous studies also.

Study limitations

The study is limited by the modest numbers of patients involved and was not adequately powered to assess the primary end point of in-hospital death, reinfarction or recurrent ischemia. Blinding of patients in this trial was not feasible, and reporting bias therefore may have potentially influenced the results.

Conclusions

Mortality in acute ST elevation myocardial infarction is higher in thrombolysed group than who undergo primary angioplasty. Primary PCI significantly reduces mortality in all the subgroups studied. (Females, Males, AWMI, IWMI, IWMI+RVMI, those who present >6 hours, and Diabetics). Left ventricular dysfunction, and recurrent angina are significantly lower in the primary angioplasty group at 1 month. There is a statistical trend towards decrease in reinfarction and 1 month mortality in the primary angioplasty group.

References

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