

## Outcome of Thrombolysis in Acute Myocardial Infarction in a Tertiary Care Hospital

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### Abstract

**Introduction:** The main purpose of thrombolysis in acute myocardial infarction is early and complete reperfusion. Incomplete or delayed thrombolysis is associated with an increased risk of death and left ventricular dysfunction. The time to reperfusion and complete reperfusion remain the key determinants for appropriate outcome of cardiovascular events.

**Objective:** To find out the effect of thrombolytic therapy and its outcome in relation with timing of thrombolysis and associated risk factors in ST elevated myocardial infarction (STEMI) patients.

**Materials and Methods:** This cross-sectional interventional study was carried out in combined military hospital, Dhaka from July 2017 to May 2018. Total 85 patients of acute STEMI having specified criteria were selected and treated with Streptokinase at a dose of 1.5 million units diluted in 100 mL normal saline. Twelve-lead ECG was recorded immediately before the start of thrombolytic therapy and 180 min afterwards.

**Results:** Among 85 STEMI patients, 65 were male and the age range was 40-80 years. Sixty nine patients (81.2%) underwent thrombolysis within 12 hours of onset of chest pain among them complete resolution of ST segment occurs in 45(65.2%) patients while 16 patients (18.8%) received thrombolysis after 12 hours among them complete resolution occurs only in 7(43.8%) patients. This difference was statistically significant ( $p < 0.05$ ). Fully reperfused patients have no complications. Patients having diabetes mellitus, presented with atypical chest pain and received thrombolytic therapy after 12 hours had various types of complication.

**Conclusion:** STEMI patients received thrombolysis therapy within 12 hours of onset of chest pain responded well to thrombolytic therapy.

**Key-words:** Acute myocardial infarction, STEMI, Thrombolysis, Complete resolution.

### Introduction

The acute coronary syndrome includes ST segment elevation myocardial infarction (STEMI), non-ST segment elevation myocardial infarction and unstable angina. When there is total occlusion of an epicardial coronary artery, ST elevation is shown on ECG which is electrical manifestation of the patho-physiological changes and is known as STEMI<sup>1</sup>. Diabetes mellitus is one of the six primary risk factors identified for acute myocardial infarction (AMI), others are dyslipidaemia, hypertension, smoking, male gender, and family history of ischemic heart disease (IHD)<sup>2</sup>. ECG is one of the diagnostic tools for STEMI and therefore it should be done immediately on hospital admission. Unsuccessful thrombolysis leading to adverse events is usually seen in patients who are not treated early<sup>3,4</sup>. Hence in the treatment of acute myocardial infarction, early thrombolysis has become the established fact<sup>5</sup>. In case of STEMI, post thrombolytic analysis of ST segment resolution on ECG offers cost effective solution to assess coronary reperfusion<sup>6</sup>. Successful epicardial vessel thrombolysis is necessary for better prognosis, but the outcome more strongly correlates with the micro vascular flow. ST segment on ECG is therefore a better indicator of prognosis, which cannot be assessed on the basis of cardio angiogram alone<sup>7,8</sup>.

Intravenous streptokinase during acute myocardial infarction is a well recognized and effective treatment, which has beneficial effects on cardiovascular event related mortality. Conceptually, therapeutic interventions for STEMI minimize cell death by interrupting the ongoing process of infarction and attempt to reverse the ischemic metabolic derangement of viable cells. The aim of thrombolysis in acute myocardial infarction is early and complete reperfusion. Incomplete or delayed reperfusion is associated with an increased risk of death and left ventricular dysfunction. The time to reperfusion therapy and complete reperfusion remain the key determinants for fibrinolysis. ST-segment recovery over serial ECG's in STEMI represents both reversal of ischemia and interruption of the infarction. Although randomized trials comparing primary angioplasty and

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intravenous thrombolysis have consistently shown the superiority of the former mode of reperfusion therapy<sup>9</sup>. In Bangladesh advanced treatment of AMI like different thrombolytic therapies and percutaneous coronary intervention (PCI) is not available in every health care facility, even in all tertiary care hospitals. So due to delay in diagnosis and lack of availability of appropriate treatment various complications develop and patients may die.

In the Comparison of primary angioplasty and pre-hospital fibrinolysis in acute myocardial infarction trial, pre hospital thrombolysis appeared superior to primary angioplasty in the patients in whom thrombolytic treatment could be administered before 2 hours from symptom onset<sup>10</sup>. These data are concordant with the observation from the meta-analysis of trials of thrombolytic therapy that showed an exponential decrease in the efficacy of thrombolysis in the patients treated 3 hours of the onset of chest pain<sup>11</sup>. In this regard, it is now clear that myocardial salvage is highly dependent on the time from the beginning of symptoms to reperfusion<sup>12</sup> and that very early administration of thrombolytic is likely to result in superior myocardial salvage compared with in-hospital thrombolysis and possibly also primary PCI<sup>13</sup>.

### Materials and Methods

This cross sectional interventional study was carried out in combined military hospital, Dhaka from July 2017 to May 2018. Consecutive 85 acute STEMI patients were selected based on the ECG criteria, serum troponin-I level higher than twice the upper normal limit, reported within 18 hours of onset of chest pain and not treated with primary percutaneous coronary intervention. Patients having contraindications to use of streptokinase administration like; history of using streptokinase within previous 6 months, allergy to the drug, surgery or cerebrovascular accident within previous 6 weeks, warfarin therapy, active peptic ulcer disease, bleeding disorders and uncontrolled hypertension were excluded from the study. Streptokinase was given to each of the selected patient at a dose of 1.5 million units, diluted in 100 mL normal saline within an hour. Twelve-lead ECG was recorded immediately before the start of thrombolytic therapy and 180 min afterwards. Complete resolution was defined as a reduction of >70%, partial resolution as a reduction of 30% to 70%, and no resolution as reduction of <30% in ST elevation after 3 hours of thrombolysis. All the necessary information was recorded in a structured data collection sheet and was analyzed by SPSS for windows version 23.0. Chi-square test was performed to compare the outcome and  $p < 0.05$  considered as significant.

### Results

Among the 85 STEMI patients 65 were male and 20 were female with the age range of 40-80 years. Selected patients 53(62.4%) were diabetic, 64(75.3%) were hypertensive, 60(70.6%) were smoker and 30(35.3%) had positive family history of IHD. In ECG findings highest 35(41.2%) of patients had inferior MI followed by anterior MI 30(35.3%) patients (Table-I).

**Table-I:** Distribution of patients by the site of infarction (n=85)

| Site of Infarction | Frequency | %    |
|--------------------|-----------|------|
| Anterior MI        | 30        | 35.3 |
| Inferior MI        | 35        | 41.2 |
| Lateral MI         | 08        | 09.4 |
| Right ventricular  | 12        | 14.1 |
| Total              | 85        | 100  |

Sixty nine (81.2%) patients underwent thrombolysis within 12 hours of onset of chest pain among them 45(61.2%) had complete resolution of ST in ECG while 16(18.8%) patients underwent thrombolysis after 12 hours among them only 7(43.8%) had complete resolution (Table-II). This difference was statistically significant ( $p < 0.05$ ).

**Table-II:** Distribution of patients by outcome of thrombolysis (n=85)

| Time of Thrombolysis | Outcome             |                    |          |           | Statistics                                 |
|----------------------|---------------------|--------------------|----------|-----------|--|
|                      | Complete resolution | Partial resolution | Failed   | Total     |  |
| < 12 hours           | 45 (65.2%)          | 20 (29.0%)         | 4 (5.8%) | 69 (100%) | $\chi^2 = 6.09$ ;<br>df = 2;<br>$p < 0.05$ |
| > 12 hours           | 7 (43.7%)           | 5 (31.3%)          | 4 (25.0) | 16 (100%) |  |
| Total                | 52 (61.2%)          | 25 (29.4%)         | 8 (9.4%) | 85 (100%) |  |

Infarct related complications were present in spite of successful thrombolysis (Table-III). But thrombolytic therapy i.e. streptokinase related complications were few; 35.29% patients had reperfusion arrhythmia while 23.52% patients had haematuria.

**Table-III:** Distribution of patients on the basis of Infarct related complication

| Time of Thrombolysis | Complications     |               |                     |                |       |
|----------------------|-------------------|---------------|---------------------|----------------|-------|
|                      | Cardiogenic shock | Heart failure | Atrial fibrillation | Complete block | Death |
| < 12 hours           | 4                 | 17            | 15                  | 4              | 1     |
| > 12 hours           | 5                 | 10            | 7                   | 5              | 1     |

### Discussion

In this study, thrombolytic therapy was given to 69 patients who presented within 12 hours of chest pain having STEMI but rest of the patients received late fibrinolytic therapy because of delayed reporting, ongoing chest pain and persistent ST elevation in ECG with positive troponin-I.

Complete ST-resolution in patients with acute MI most likely identifies patients with successful reperfusion following streptokinase therapy, and these patients proved to be a very low-risk group with good prognosis. But failed or no ST-resolution identifies patients with failed myocardial reperfusion, which means that these patients have a higher risk for an adverse outcome<sup>14</sup>. However, partial ST-resolution is related to impairment of reperfusion at the myocardial level, reflecting the unpredictable effect of streptokinase<sup>15,16</sup>. In this study 61.2% patients had a complete resolution of ST in ECG and had better prognosis compared to partial or failed thrombolysis. This result was consistent with the study carried by Sammer et al<sup>17</sup>.

In this study patient received thrombolysis therapy within 12 hours had significantly (65.2% vs 43.8%;  $p < 0.05$ ) better outcome than received late thrombolysis. This result was consistent with similar study carried out in Bangladesh<sup>18</sup> on the effects of streptokinase between diabetic and non diabetic patients of AMI carried out in where 'complete ST resolution' was seen in non-diabetic patient (48.4 vs. 19.7%;  $Z = 4.25$ ;  $p < 0.001$ ) whereas type 2 diabetic subjects were presented with significantly higher incidence of failed ST-resolution than non-diabetic subjects (67.2 vs. 19.8%;  $Z = 6.79$ ;  $p < 0.001$ ). This significant change in ST-resolution between non-diabetic and diabetic group was similar with the study done by Zairis et al<sup>19</sup> who showed significant difference between diabetic and non-diabetic patient in relation to complete (34.1 vs. 68.2%;  $p < 0.001$ ) and incomplete (65.9 vs. 31.8%;  $p < 0.001$ ) resolution. The complications were also common in these groups of patients with worse outcome like cardiogenic shock, heart failure, death which is consistent with the result of study carried out in Bangladesh<sup>20</sup>.

## Conclusion

STEMI patients who received thrombolytic therapy within 12 hours of onset of chest pain had better outcome than patients who received thrombolysis after 12 hours.

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