



## Successful or Unsuccessful Thrombolysis with Streptokinase in Acute Myocardial Infarction: A Descriptive Study

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### Abstract

**Background & Objectives:** Acute myocardial infarction (AMI) is becoming increasingly important problem in developing countries, and thrombolysis is the main modality of treatment here. About 25-50% of patients fail to achieve successful reperfusion and these patients have poor prognosis. Since alternative modes of reperfusion are available, it is important to identify them. To study the effect of thrombolytic therapy in term of success and failure on the type of ST elevation MI, using streptokinase.

**Material and Methods:** This was a comparative study, conducted at Department of Cardiology, Rajarajeswari Medical College & Hospital Bangalore, from 1<sup>st</sup> October 2016 to 31<sup>st</sup> November 2017. Patients with first acute myocardial infarction were divided into group A (successful thrombolysis) and group B (unsuccessful thrombolysis) using ECG criteria.

**Results:** Total number of patients were 104. Group A included 70 (67.30%) patients and group B included 34 (32.70%) patients. There were total 46 (44.23%) patients of anterior MI with 24 patients in group A and 22 patients in group B (34.28% vs 64.70%,  $p < 0.001$ ). There were total 56 (53.84%) patients of inferior MI with 45 patients in group A and 11 patients in group B (64.28% vs 32.35%,  $p < 0.001$ ). Lateral myocardial infarction was diagnosed in 2 (1.9%) patients with 1 patient each in group A and group B (1.44% vs 2.9%,  $p = 0.583$ ).

**Conclusion:** Anterior MI was associated with a higher rate of thrombolysis failure while inferior MI and lateral wall MI was associated with a higher rate of successful thrombolysis.

**Keywords:** Myocardial infarction; thrombolysis; type of myocardial infarction.

### Introduction

Acute myocardial infarction is one of the most common diagnoses in hospitalised patients in industrialized countries.<sup>[1]</sup> Despite the impressive

strides in diagnosis and management over the past three decades, acute myocardial infarction continues to be a major health problem in industrialized world and is becoming and

increasingly important problem in developing countries.<sup>[2]</sup> Because acute myocardial infarction strikes an individual during the most productive years, it can have profoundly deleterious psychological and economic ramification. The unequivocal demonstration of role of the thrombus in acute myocardial infarction quickly led to the systematic testing of thrombolytic strategies to abort myocardial infarctions.<sup>[3]</sup> The thrombolytic therapy is the main mode of reperfusion in developing countries like India.

Although 60 to 70% of treated patients can be successfully reperfused, thrombolytic treatment fails in a substantial proportion. These non-responsive patients can have a significant high mortality and morbidity. Since alternative modes of coronary intervention are available, it is prudent to identify patients with failed thrombolysis so that they can be offered alternative modes of reperfusion.<sup>[4]</sup> The diagnosis of unsuccessful thrombolytic treatment is currently best achieved with repeat 12 lead ECGs. Many ECG criteria for the diagnosis of unsuccessful thrombolysis have been examined. The criterion that appears to be most established is failure of the elevated ST segment to fall by 50% or more. If measured two hours after the start of thrombolysis the diagnostic accuracy is about 80–85% for failure to achieve TIMI 3 flow.<sup>[5]</sup> ST segment resolution 90–180 minutes after thrombolysis is a strong predictor of survival and preservation of left ventricular function.<sup>[6]</sup> It is a useful marker of successful thrombolysis and relates to clinical outcome and if assessed routinely, ST resolution might assist in the identification of low-risk patients.<sup>[7]</sup> As unsuccessful thrombolysis signifies a poor prognosis, this study will help in timely screening of high risk patients (patients with anterior MI) for further appropriate therapeutic percutaneous coronary invasive interventions (PCI), as a recently published study has proven that PCI was associated with better reperfusion and mortality outcome compared to streptokinase in patients with anterior AMI (relative risk 1.6,  $p=0.03$ ).<sup>[8]</sup>

## Materials and Methods

**Source of Data:** The present study was undertaken at Rajarajeswari medical college and hospital, Bangalore, from 1<sup>st</sup> October 2016 to 31<sup>st</sup> November 2017. 104 cases of thrombolysed acute myocardial infarction (MI) were studied. Sample is drawn by simple random technique.

**Sample Size:** Total cases - 104

## Inclusion criteria

- Patients admitted to RRMC&H hospital ICCU who have at least 2 out of 3 criterias for acute myocardial infarction as defined by WHO.<sup>9</sup>

## Exclusion criteria

- Presence of contra indications to streptokinase therapy.
- Patients presenting with evolved myocardial infarction.
- Patients dying within 90 minutes of streptokinase therapy.
- Patients presenting with left bundle branch block.

**Study protocol:** In patient with acute MI after considering inclusion and exclusion criteria, history and clinical examination done. Baseline ECG and other investigations (RBS, Lipid Profile, RFT, Cardiac Enzymes – if required, Hemogram) were done. Patients treated with 325mg of Aspirin orally & 15 lakh units of streptokinase infusion over 1 hour. Other treatments ( $\beta$ -blocker, ACEI, Heparin, Analgesics) were used as indicated. Patients are assigned to successful / failed thrombolysis based on 90 min ECG after thrombolysis. Successful / failed thrombolysis is diagnosed based on ECG taken 90 min after thrombolysis. Failed thrombolysis is considered if there is less than 50% ST segment resolution in the single lead showing maximum ST elevation at baseline ECG.<sup>10</sup> ST elevation is measured at 80 msec from J-point.

**Statistical Analysis:** In the present study values are expressed as mean  $\pm$ 1 standard deviation or as percentages. Variables are compared by student 't' test. Attributes are compared by Chi square test with Yates correction. In this study strength of association is said to be significant if 'p' value  $\leq$  0.05.

## Results

A total of 104 patients with acute myocardial infarction treated with streptokinase were included in this study. On the basis of our ECG criteria for successful/unsuccessful thrombolysis, these 104 patients were divided into two groups, i.e., successful thrombolysis group (group A) and unsuccessful thrombolysis group (group B). Group A included 70 (67.30%) patients and group B included 34 (32.70%). Gender/age-wise distribution of patients is shown in Table-1. Type of MI in group A and group B is shown in Table-2.

**Table-1:** A gender/age-wise distribution of patients (n=104)

Age (year)	No.	Percentage
30-40	9	8.67
41-50	22	21.15
51-60	34	32.69
61-70	27	25.96
71-80	10	9.61
81 and above	2	1.92
Total	104	100

**Table-2:** Type of MI in group A and B [n (%)]

Type of MI	Group A (n=70)	Group B (n=34)	Total	P
Anterior Myocardial Infarction	24(34.28)	22(64.70)	46(44.23)	<0.001
Inferior Myocardial Infarction	45(64.28)	11(32.35)	56(53.84)	<0.001
Lateral Myocardial Infarction	1(1.44)	1(2.9)	02(1.93)	0.583

## Discussion

In our study, thrombolysis was successful, in terms of ST-segment resolution in 67.30% of patients, which is more in comparison to a study by Bhatia *et al*<sup>11</sup>, GUSTO-I trial<sup>12</sup>, Lee *et al*<sup>13</sup>, and Goldhammar *et al*<sup>14</sup> where it was successful in 53%, 54%, 43.2% and 56.4% respectively. The better result in our study could be due to early diagnosis, and lesser door to needle time, as our hospital is located in the centre of the city. In our

study in successful thrombolysis group anterior MI was present in 24 (34.28%), inferior MI in 45 (64.28%), and lateral MI in 1 (1.44%) patients. In unsuccessful thrombolysis group, anterior MI was present in 22 (64.70%), inferior MI in 11 (32.35%) and lateral MI in 1 (2.9%) patients. Our findings correlates to a study by Lee *et al*, in which Anterior infarct was associated with higher thrombolysis failure as compared to inferior and lateral MI. (AOR 0.07, 95% CI 0.03–0.16;  $p<0.001$ )<sup>13</sup>. Our study results also correlate well to a study by Brenner SJ<sup>15</sup> who showed that patients with anterior location of infarct had more thrombolysis failure compared to inferior infarct.<sup>15</sup> Our results also correlate well to INJECT trial,<sup>16</sup> where in successful thrombolysis group, 67% of patients had an inferior MI and 33% had an anterior MI; in the failed thrombolysis group, these findings were reversed. Our study also correlates well to a study, by Schroder *et al*, in which the proportion of patients with anterior infarction (*vice versa* for inferior infarction) was smaller in the complete ST segment elevation resolution groups and larger in the no ST segment elevation resolution groups.<sup>17</sup>

## Conclusion

Anterior infarct was associated with higher thrombolysis failure with streptokinase.

## Limitations & Knowledge

Criteria for thrombolysis failure with streptokinase were based solely on ECG, and achievement of TIMI grade 3 flow was not confirmed with coronary angiography, which is the gold standard. The ST segment after acute myocardial infarction is dynamic, and our use of static measurements could have led to errors in labelling of patients as successful or unsuccessful reperfusion. The small size of our sample increases the likelihood of type 1 or 2 errors. Moreover, the results do not translate to patients with bundle branch block or other electrocardiographic features where ST segment resolution cannot be determined.

Long symptom to needle time is an important predictor of failed thrombolysis in acute myocardial infarction patients. Hence it is important to educate public about prompt recognition of symptoms and seeking medical help urgently. As it is also seen commonly in patients with old age, diabetes and dyslipidemia, such patients should be monitored and treated aggressively. Persistence of chest pain beyond 2 hours and non-resolution of reciprocal ST depression can serve as additional markers of failed thrombolysis. As failed thrombolysis can be associated with poor prognosis its recognition and appropriate further management is needed.

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