ORIGINAL ARTICLE

# COMPARATIVE ANALYSIS OF TYPE OF MYOCARDIAL INFARCTION IN PATIENTS WITH SUCCESSFUL OR UNSUCCESSFUL STREPTOKINASE THROMBOLYSIS FOLLOWING ST ELEVATION MYOCARDIAL INFARCTION

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**Objective:** 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, Lady Reading Hospital, Peshawar, from October 2006 to October 2007. 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 200. Group A included 136 (68%) patients and group B included 64 (32%) patients. There were total 88 (44%) patients of anterior MI with 47 patients in group A and 41 patients in group B (34.6% vs 64.0%, *p*<0.001). There were total 110 (55.0%) patients of inferior MI with 88 patients in group A and 22 patients in group B (64.7% vs 34.4%, *p*<0.001). Lateral myocardial infarction was diagnosed in 2 (1%) patients with 1 patient each in group A and group B (0.7% vs 1.6%, *p*=0.583). **Conclusion:** Anterior MI was associated with a higher rate of thromblysis 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

The management of lytic failures and slow response to perfusion therapy perhaps the most vexing current problem facing doctors working in coronary care units and interventional catheter laboratories.

Thrombolytic therapy for acute myocardial infarction (MI) reduces case fatality and improves clinical outcomes.[1,2] However, in up to 60% of patients the thrombolytic therapy does not restore perfusion in the myocardium at risk[3] and such failure indicates a worse prognosis in term left ventricular failure, arrhythmia, cardiogenic shock, aneurysm formation and death.[4]

Coronary angiography is the gold standard to determine coronary artery patency after reperfusion therapy but it is expensive, invasive and not always available. Therefore, bedside noninvasive markers are more attractive options. Among these, ECG has good predictive value and sensitivity.[5] It is also easily available and cheap. Sutton *et al*[5] showed that less than 50% resolution of ST segment elevation in the worst infarct lead has a sensitivity of 81%, specificity of 88% and positive predictive value of 87% to predict less than TIMI-3 flow. Thrombolysis has become the established fact in the treatment of acute myocardial infarction.[6] It has well demonstrated benefits, saving lives and reducing left ventricular damage, but is far from perfect. The mega-trials have sent a clear message that the greatest benefits are seen with patients who are treated early.[7]

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.[3] ST segment resolution 90–180 minutes after thrombolysis is a strong predictor of survival and preservation of left ventricular function.[8] 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.[9]

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).[10]

## MATERIAL AND METHODS

This comparative study was conducted at Cardiology Department of Postgraduate Medical Institute, from October 2006 to October 2007. Two hundred patients with first ST elevation myocardial infarction were included in the study by non-probability purposive sampling. Patients with persistent chest pain of ischemic

nature presenting within 12 hours of onset of pain and having ST elevation of at least 2 mm in 2 or more leads on ECG were included in the study. Patients with either Contraindications to thrombolytic therapy, previous myocardial infarction and ST elevation MI more than 12 hours duration were excluded from the study.

Informed consent was taken after explaining the purpose and procedure of the study. A baseline (pre-thrombolysis) 12 lead ECG was recorded immediately before initiation of streptokinase, and at 120 minutes thereafter (post-thrombolysis ECG). The lead with maximum ST segment elevation in the pre-thrombolysis ECG was used for comparison with the post-thrombolysis ECG. ST segment elevation was measured in millimeters at 80 ms beyond the J-point. Successful thrombolysis was taken as $\geq 50\%$ resolution of the maximum ST segment elevation at 120 minutes. Unsuccessful Thrombolysis was defined as <50% resolution of the ST segment elevation in the lead with the maximum ST segment elevation two hours after the initiation of streptokinase. Acute ST elevation MI was defined typical chest pain lasting more than 30 minutes, unrelieved by sublingual nitrates, and associated with typical ST segment elevation on the standard 12 lead ECG.

Chi-square test was applied to measure the proportions of localisation of MI between unsuccessful and successful thrombolysis and $p < 0.05$ was taken as significant. Data were analysed using SPSS-12.

## RESULTS

A total of 200 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 200 patients were divided into two groups, i.e., successful thrombolysis group (group A) and unsuccessful thrombolysis group (group B). Group A included 136 (68%) patients and group B included 64 (32%). 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=200)**

| Age (year) | No. | % |
|---|---|---|
| 30–40 | 17 | 8.5 |
| 41–50 | 43 | 21.5 |
| 51–60 | 66 | 33.0 |
| 61–70 | 52 | 26.0 |
| 71–80 | 20 | 10.0 |
| 80 and above | 2 | 1 |
| Total | 200 | 100 |

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

| Type of MI | Group A (n=136) | Group B (n=64) | Total | p |
|---|---|---|---|---|
| Anterior myocardial infarction | 47 (34.6) | 41 (64.0) | 88 (44) | <0.001 |
| Inferior myocardial infarction | 88 (64.7) | 22 (34.4) | 110 (55) | <0.001 |
| Lateral myocardial infarction | 1 (0.7) | 1 (1.6) | 2 (1) | 0.583 |

## DISCUSSION

In our study, thrombolysis was successful, in terms of ST-segment resolution in 68% of patients, which is more in comparison to a study by Bhatia *et al*[11], GUSTO-I trial[12], Lee *et al*[13], and Goldhammar *et al*[14] 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 47 (43.6%), inferior MI in 88 (64.7%), and lateral MI in 1 (0.7%) patients. In unsuccessful thrombolysis group, anterior MI was present in 41 (64%), inferior MI in 22 (34.4%) and lateral MI in 1 (1.6%) 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; $p<0.001$)[13]. Our study results also correlate well to a study by Brener SJ[15] who showed that patients with anterior location of infarct had more thrombolysis failure compared to inferior infarct.[15] Our results also correlate well to INJECT trial,[16] 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.[17]

## CONCLUSION

Anterior infarct was associated with higher thrombolysis failure with streptokinase.

## LIMITATIONS

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.

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