

A COMPARATIVE ANALYSIS OF IN-HOSPITAL LEFT VENTRICULAR FUNCTION IN PATIENTS WITH SUCCESSFUL OR UNSUCCESSFUL STREPTOKINASE THROMBOLYSIS FOLLOWING ACUTE MYOCARDIAL INFARCTION

Sher Bahadar Khan¹, Rafiullah², Hafiz ur Rehman³, Tariq Nawaz⁴, Syed Tahir Shah⁵,
Syed Sadiq Shah⁶, Hameedullah⁷, Abdul Hadi⁸, Muhammad Hafizullah⁹,
Adnan Mahmood Gul¹⁰, Hikmatullah Jan¹¹, Syed Farhat Abbas Shah¹²

ABSTRACT

Objective: To compare in-hospital left ventricular function in patients with unsuccessful and successful thrombolysis presenting with acute myocardial infarction treated with streptokinase.

Methodology: This comparative study was conducted at department of Cardiology, Lady Reading Hospital Peshawar, from October 2006 to October 2007. Two hundred patients with first acute myocardial infarction were divided into two groups: group A (successful thrombolysis) and group B (unsuccessful thrombolysis), using ECG criteria. To determine Left Ventricular Function, 2-D Echo was used.

Results: Group A included 136 (68%) patients and group B included 64 (32%) patients. Impaired left ventricular function was found in 41 (30.1%) patients in group A and 41 (64.1%) patients in group B ($p < 0.001$). Left ventricular failure was present in 31 (22.8%) patients of group A and 30 (46.9%) patients of group B ($p = 0.001$). Cardiogenic shock was diagnosed in 2 (1.5%) patients in group A and 6 (9.4%) patients in group B ($p = 0.008$).

Conclusion: Presence of LVF is strongly associated with unsuccessful thrombolytic therapy in this group of patients.

Key Words: Myocardial infarction, thrombolysis, diagnosis.

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INTRODUCTION

Most of the adverse events after myocardial infarction occur in the first 48-72 hours¹. In a local study cardiac failure were the commonest complications of acute myocardial infarction². Despite better outcomes with early coronary artery reperfusion for the treatment of acute ST-elevation myocardial infarction, morbidity and mortality from acute myocardial infarction

remain significant and the incidence of congestive heart failure continues to increase. These adverse events occur partly as a result of unsuccessful thrombolysis³, and mega-trials have sent a clear message that unsuccessful thrombolysis are seen with patients who are not treated early⁴, hence thrombolysis has become the established fact in the treatment of acute myocardial infarction⁵.

Coronary angiography is the gold standard to determine coronary artery patency after reperfusion therapy but it is expensive, invasive and not always available early. Therefore, bedside noninvasive markers are more attractive options. So 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. Among these most reliable is the one showed by Sutton et al 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-

¹⁻¹² Department of Cardiology, Lady Reading Hospital, Peshawar - Pakistan

Address for Correspondence:

Dr. Sher Bahadar Khan

Senior Registrar,

Department of Cardiology

Lady Reading Hospital, Peshawar - Pakistan

E-mail: docyousafzai@yahoo.com

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3 flow⁶. It is further supported by a study published in Heart by De Belder that failure in the 50 % resolution of ST segment, measured two hours after the start of thrombolysis has the diagnostic accuracy of about 80-85% for failure to achieve TIMI 3 flow⁷. In another study ST segment resolution 90-180 minutes after thrombolysis was assessed which showed that it is a strong predictor of survival and preservation of left ventricular function^{8,9}.

As failed thrombolysis signifies a poor prognosis, this study will help in timely screening of high risk patients (i.e. patients with unsuccessful thrombolysis) for further appropriate therapeutic invasive interventions.

METHODOLOGY

This comparative study was conducted at Cardiology department of Post Graduate Medical Institute Lady Reading Hospital Peshawar from October 2006 to October 2007. Two hundred patients with first acute 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 or previous myocardial infarction were excluded from the study.

Informed consent was taken after explaining the purpose and procedure of the study. Data i.e. patients bio-data, echocardiography findings and various in-hospital complications were entered in the Performa. 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 defined as \geq 50% resolution of the maximum ST segment elevation at 120 minutes. Unsuccessful throm-

bolysis was defined, $<$ 50% resolution of the ST segment elevation in the lead with the maximum ST segment elevation two hours after the initiation of streptokinase. Acute Myocardial Infarction 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. Ventricular Failure was defined clinically by the presence of sinus tachycardia, third heart sound and basal crackles in the lungs. Impaired Left Ventricular Function was defined Left ventricular ejection fraction of less than 40% on 2-D echocardiography using Simpson's method. Preserved Left Ventricular Function was defined, Left ventricular ejection fraction of \geq 40% on 2-D echocardiography using Simpson's method. Cardiogenic Shock was defined Systolic blood pressure $<$ 90mm Hg for at least 30 minutes and evidence of hypoperfusion (oliguria, cyanosis, and cool extremities).

Chi-square test was applied to measure the significance of proportions of complications between failed and successful thrombolysis at 0.05 level of significance. All the study data was analyzed using computer program SPSS for windows version 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 {(male =147 (45.5%), (female =53(26.5%)} 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%). In group A out of 136, anterior MI was present in 47(43.6%), inferior MI was present in 88(64.7%) and lateral MI was present in 01 (0.7%) patients. In group B out of 64, anterior MI was present in 41(64%), inferior MI was present in 22(34.4%) and lateral MI was present in 01(1.6%) patients. Left Ventricular Function, left ventricular failure and Cardiogenic Shock in Group A and Group B are shown in tables.

Table 1: Left ventricular function in Group A and Group B (n=200)

Left Ventricular Function	Group A (n=136)	Group B (n=64)	Total	P-value
Preserved in cases	95 (69.9%)	23(35.9%)	118(59%)	$<$ 0.001
Impaired in cases	41(30.1%)	41(64.1%)	82(41%)	$<$ 0.001

Table 2: Left ventricular failure in Group A and Group B (n=200)

Left Ventricular Function	Group A (n=136)	Group B (n=64)	Total	P-value
Present in cases	31(22.8%)	30(46.9%)	61(30.5%)	0.001
Not present in cases	105(77.2%)	34(53.1%)	139(69.5%)	0.001

Table 3: Cardiogenic Shock in Group A and Group B (n=200)

Cardiogenic Shock	Group A (n=136)	Group B (n=64)	Total	P-value
Present in cases	02(1.5%)	06(9.4%)	08(9.4%)	0.008
Not present in cases	134(98.5%)	58(90.6%)	192(96.0%)	0.008

DISCUSSION

Our results correlates with prospective study done at the Punjab Institute of Cardiology, Lahore to compare, the post myocardial infarction in-patient outcome of patients with ST resolution (group A) to those without ST resolution (group B) on ECG, in a South Asian population.¹¹ This cohort was followed up through the in-hospital stay. During the follow up period (Mean stay 3.01 ± 0.77 days), impaired left ventricular function and left ventricular heart failure was the most common complication i.e to 33 (62%) patients in group B with unsuccessful thrombolysis as compared to 26 (27%) patients in group A with successful thrombolysis ($p < 0.001$)¹⁰.

In an international study, thrombolysis was successful, in terms of ST-segment resolution, in 45 patients (53%). The patients with unsuccessful thrombolysis had more than twice the rate of adverse events i.e. impaired left ventricular function, left ventricular failure, reinfarction, sudden death and arrhythmia ($p < 0.001$)⁹. The most striking difference was in the proportions of patient who had an uncomplicated in-hospital stay i.e. 62% of the successful thrombolysis group compared with 17% of the unsuccessful thrombolysis group ($p < 0.001$). After adjustment for other factors, ST resolution was the only independent predictor of an uncomplicated recovery in hospital (OR 6.8, 95% CI 2.3 to 19.9, $p < 0.001$)¹⁰.

In a study by Lee et al, there were a total of 109 patients (56.8%) who had unsuccessful thrombolysis compared to 83 patients (43.2%) who had a successful thrombolysis. Anterior infarct was associated with higher thrombolysis failure (AOR 0.07, 95% CI 0.03–0.16; $p < 0.001$)¹². This correlates well to our study whereout of total 200

patients 88(44%) had anterior wall MI, in which group A had 47(34.6%) cases and group B 41(64.0%) with statistical significance. Out of total 200 patients 110(55%) had inferior wall MI, in which group A had 88(64.7%) cases and group B 22(34.4%) with statistical significance. In a study by Lee et al many patients (30; 73.2%) in the unsuccessful thrombolysis group experienced recurrent episodes of acute coronary syndrome requiring multiple hospital admissions (crude OR 2.49, 95 % CI 1.16-5.32; $p = 0.02$). Furthermore thrombolysis failure was associated with higher mortality after one year (crude OR 7.61, 95 % CI 0.95-61.24; $p = 0.04$)¹¹.

In another study thrombolysis was determined to have been successful in 88 patients (56.4%), unsuccessful in 48 patients (30.8 %) and equivocal in 20 patients (12.8%). Left ventricular ejection fraction was higher in successful thrombolysis group compared with unsuccessful thrombolysis group ($p < 0.001$) and LV failure was less frequent in successful thrombolysis group in comparison with unsuccessful thrombolysis group ($p < 0.001$)¹².

On the basis of the results of the current study, our hypothesis was proved to be true i.e there is a significant difference between LV function in patients with unsuccessful and successful thrombolysis presenting with acute MI treated with streptokinase.

LIMITATIONS

Criteria for thrombolysis failure with streptokinase was 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 failed 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.

CONCLUSION

Unsuccessful thrombolysis in patients with acute myocardial infarction receiving streptokinase is associated with reduced left ventricular function.

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None Declared

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CONTRIBUTORS

SBK conceived the idea and planned the study. R, HUR, TN, STS, SSS, H, AH, MH, AMG, HJ & SFAS did the data collection and analyzed the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.