

VALIDATION OF ECG CRITERIA OF SUCCESSFUL THROMBOLYSIS

Umar Farooq¹, Syed Nauman Ali², Kashif Ali Hashmi³

¹⁻³ Department of Cardiology,
Chaudhry Pervaiz Elahi Institute of
Cardiology, Multan, Pakistan

Address for Correspondence:

Dr. Umar Farooq,

Department of Cardiology, Chaudhry
Pervaiz Elahi Institute of Cardiology,
Multan, Pakistan

E-Mail: drnaumanali@yahoo.com

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Contribution

All the authors contributed significantly to the research that resulted in the submitted manuscript.

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ABSTRACT

Objective: To determine the frequency of TIMI (Thrombolysis in Myocardial Infarction) grade 3 on angiography in patients presenting with acute STEMI who fulfill ECG criteria of successful thrombolysis after being thrombolysed with streptokinase.

Methodology: This descriptive study was conducted at Chaudhry Pervaiz Elahi Institute of Cardiology, Multan from August 2013 to March 2014. Patients with acute STEMI who were thrombolysed with streptokinase and whom ECGs were meeting criteria of successful thrombolysis (showing ST segment resolution of 50% from J point) were included. These patients under went coronary angiography to evaluate the frequency of TIMI grade 3 flow. Data was analysed using SPSS version 16.

Results: A total of 178 patients were studied. Males were 84.8% (n=151). Mean age was 47.06 ± 1.26 years (25-65 years). TIMI grade 3 flow on angiography was achieved in 82.6% (n=147) while 17.4% (n=31) patients did not. There was no statistically difference of TIMI grade 3 between males and females (81.5% vs. 88.9%, $p=0.348$). In comparison to non-diabetics, less number of diabetic patients achieved TIMI grade 3 flow (88.5% vs. 66.7%, $p=0.001$). Similarly, non-hypertensive have got more TIMI grade 3 vs. hypertensive patients (92.2% vs. 65.1%, $p=0.000$). There was no statistical difference between the patients with family history of IHD and those without family history of IHD (74.4% vs. 85.2%, $p=0.105$). Surprisingly, smokers had got more TIMI grade 3 as compared to non-smokers (88.1% vs. 75.3%, $p=0.026$).

Conclusion: We concluded that ECG criteria of successful thrombolysis is very good predictor of infarct related artery patency.

Key Words: TIMI Grade 3, Angiography, ECG Criteria of Successful Thrombolysis, STEMI

INTRODUCTION

Acute ST-segment elevation myocardial infarction (STEMI) is the life threatening emergency. Patients usually present with severe central chest pain. On 12 lead ECG, there is ST-segment elevation in corresponding leads.¹ The primary goal in the management of acute STEMI is to institute reperfusion therapy as quickly as possible. All patients with STEMI who seek treatment within 12 hours from onset of continues symptoms should be considered for immediate reperfusion therapy.² After successful reperfusion therapy ST-segment resolution occurs. Rapid, simple and inexpensive measures are needed to assess the efficacy of reperfusion therapy in clinical practice.³ ST segment monitoring on ECG is a simple mean of assessing reperfusion in patients receiving thrombolytic therapy, because a patients who fail to achieve reperfusion of coronary artery after thrombolytic therapy remain at high risk for morbidity and mortality.^{4,5} Non-invasive measures of infarct related artery patency are needed to identify candidates for rescue intervention. Previously ST segment resolution was considered a specific marker of successful thrombolysis and correlated with patency of artery.⁶ We conducted a study to validate ECG criteria of 50% resolution of ST segment elevation as a marker of successful thrombolysis determined via TIMI 3 flow rate on coronary angiography in patients of acute myocardial infarction.^{7,8}

The objective was to determine the frequency of TIMI (Thrombolysis in Myocardial Infarction) grade 3 on angiography in patients presenting with acute STEMI who fulfill ECG criteria of successful thrombolysis after being thrombolysed with streptokinase.

METHODOLOGY

This descriptive cross sectional study was conducted at Chaudhry Pervaiz Elahi Institute of Cardiology, Multan from August 2013 to March 2014. Patients with acute ST elevation myocardial infarction who were thrombolysed with streptokinase and whom ECGs were meeting criteria of successful thrombolysis (showing ST segment resolution of 50% from J point) were included. Detail history including cardiovascular risk factors were recorded. These patients under went coronary angiography to evaluate the frequency of TIMI grade 3 flow.

The statistical analysis was performed using the statistical package for social sciences (SPSS Ver. 15.0). Numerical variables like age were presented as mean \pm SD. Categorical variables were presented as frequencies and percentages. P-value <0.05 was taken statistically significant.

RESULTS

A total of 178 patients who were fulfilling ECG criteria were

studied. Males were 84.8% (n=151). Mean age was 47.06 \pm 1.26years(25-65 years). Out of the 178 subject who fulfill ECG criteria of successful thrombolysis, 82.6% (n=147) were found to achieve TIMI grade 3 on angiography while 17.4%(n=31) patients did not achieve TIMI grade 3. There was no statistically difference of TIMI grade 3 between males and females (81.5% vs. 88.9%, p=0.348). In comparison to non-diabetics, less number of diabetic patients achieved TIMI grade 3 flow (88.5% vs. 66.7%, p=0.001). Similarly, non-hypertensive got more TIMI grade 3 as compared to hypertensive patients(92.2% vs. 65.1%,p=0.000). There was no statistical difference between the patients with family history of IHD and the patients without family history of IHD (74.4% vs. 85.2%, p=0.105). Surprisingly, smokers had got more TIMI grade 3 as compared to non-smokers(88.1% vs. 75.3%, p=0.026) (Table 1).

Table 1: Cardiovascular Risk Factors and TIMI Grade 3 Flows in Patients with Successful Thrombolysis

Risk Factors	TIMI Grade 3 flow achieved	TIMI Grade 3 flow not achieved	P-value
Diabetic vs. Nondiabetic	66.7%	33.3%	0.001
Nonhypertensive vs. Hypertensive	92.2%	7.8%	0.000
Family hx of IHD Present	74.4%	25.6%	0.105
Absent	85.2%	14.8%	
Smokers Non-Smoker	88.1%	11.9%	0.026
	75.3%	24.7%	

DISCUSSION

Acute STEMI is life threatening emergency. It occurs due to occlusion of one of the three coronary arteries due to thrombus. It causes ST-segment elevation on ECG of patient in corresponding leads. This kind of patient needs immediate coronary reperfusion therapy. Reperfusion therapy is of two types: one is primary PCI and other is thrombolysis. In our part of world, we usually thrombolysed the patient with streptokinase who present to us with acute STEMI to reperfuse coronary artery. After successful reperfusion, ST-segment resolution occurs which can be confirmed on angiography. ST-segment resolution $>50\%$ is considered as ECG criteria of successful thrombolysis.⁸

This research was aimed to see whether the ST-segment resolution i.e. ECG criteria of successful thrombolysis is reliable non-invasive marker of infarct-related coronary

artery patency by observing TIMI grade 3 on coronary angiography.

This study showed that 82.6% patients had got TIMI grade 3 on angiography who fulfill ECG criteria of successful thrombolysis and rest of 17.4% patients did not achieve TIMI grade 3 in spite fulfilling ECG criteria of successful thrombolysis.⁹ This study has confirmed that ST-segment resolution i.e. ECG criteria of successful thrombolysis is reliable non-invasive marker of infarct related artery patency. On bedside, we can plan for further treatment strategy like rescue-PCI if ST-segment resolution does not occur after thrombolysis and if ST-segment resolution occurs, there is no need to do angiography and coronary artery intervention.

Our results are comparable to other studies conducted, showing that TIMI grade 3 in 79% patients whose ECG showing ST-segment resolution after thrombolysis.¹⁰⁻¹⁴ Our results were slightly better. Possible reason may be less mean age of MI i.e. 47.06 years. In another study conducted, showed that 80% of the patients got TIMI grade 3 who showed resolution of ST-segment >50% along with some other non-invasive markers of reperfusion like reduction of chest pain.⁸ We also found that the patients, in whom ST-segment resolution occurs, remain chest pain free.

We also observed that risk factors like DM, HTN have adversely affected TIMI grade 3 but smokers had slightly better TIMI grade 3 as compared to non-smokers (88.1% vs.77.3%, $p=0.026$). The possible reason may be the small number of patients. It needs further research on large scale specifically to see difference between smokers and non-smokers regarding TIMI grade 3.

Certain limitations of this study prevent generalization of results. As angiography is an invasive procedure, many patients of old age or with multiple risk factors could not be included due to the risk of bleeding during or after angiography. Secondly many patients who were in our inclusion criteria refused angiography.

Further research regarding the role of ST-segment resolution i.e. ECG criteria of successful thrombolysis as inexpensive non-invasive screening tool to assess coronary artery patency in multi-center and on large population is required.

CONCLUSION

We concluded from this study that ECG criteria of successful thrombolysis is very good predictor of infarct related artery patency. Without going for invasive, expensive procedure like coronary angiography in acute setting of MI with thrombolysis, we can assess safely the coronary artery patency by seeing the ST-segment resolution and making future planning like rescue PCI if ST-segment resolution does not occur.

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