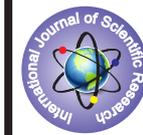


- Detection of failed thrombolysis by doing serial ECG & estimation of CPK-MB levels and its comparison with Coronary Angiography



Cardiology

KEYWORDS: words for the Paper- Angiography, Cardiac enzymes, Electrocardiography, Streptokinase.

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ABSTRACT

Background: This study is done to detect failed thrombolysis by doing serial ECG & estimation of CPK-MB levels. It is then compared to Coronary Angiography for confirmation. **Methods:** 28 out of 40 patients of AMI were thrombolysed by Streptokinase and 12 were administered anticoagulant. >50% resolution of ST segment and Post/Pre thrombolysis/anticoagulation CPK-MB Ratio was compared in both groups. Further, in study group, results were compared with that of angiography, to see the percentage of patients who underwent successful thrombolysis. **Results:** In study group, 57.1% showed >50% resolution of ST segment and 64.3% ≥ 10 times rise in CPK-MB after thrombolysis. In control group, 25% fulfilled ECG and 16.6% cardiac enzyme criteria after anticoagulation. Regarding confirmation of successful thrombolysis, 50% of study group showed TIMI Grade III Coronary blood flow in angiography. **Conclusion:** Post & pre thrombolysis ECG and CPK-MB levels seem to be a realistic strategy for assessing reperfusion failure. Such patients could then be considered for repeat thrombolysis or intervention.

INTRODUCTION

We all know that atherosclerosis is an important cause of AMI (acute myocardial infarction). Average incidence of AMI is around 208 per 100,000 person years. Early thrombolytic therapy reduces mortality & morbidity in patients with AMI.¹ Its effect is based on lysis of intracoronary thrombus & reestablishment and maintenance of adequate flow in the infarct related artery (IRA).²

According to coronary angiographic studies, reperfusion after thrombolysis, evaluated as Thrombolysis In Myocardial Infarction (TIMI), flow grade 2-3 is achieved in 55-80% of treated patients, depending upon the time of onset of symptoms to treatment with thrombolytics, and on the thrombolytic agent used.³ As prompt & complete reperfusion of the injured myocardium causes lowest mortality rates, reperfusion failure detection after thrombolytic therapy is an important clinical issue for diagnosis & treatment of this problem.

Reperfusion failure is an indication for rescue angiography. However, since routine coronary angiography is impractical & clinical assessment of thrombolytic therapy efficacy is unreliable, a rapid non-invasive method for detecting reperfusion failure is of considerable importance. The purpose of this study is to determine the early non-invasive methods for identification of failed thrombolysis.

AIMS & OBJECTIVES

1. To evaluate the effect of thrombolysis by ST segment resolution & early peaking of cardiac enzymes.
2. To establish a reliable non-invasive indicator of reperfusion failure.

MATERIALS & METHODS

This study was conducted in the Intensive Cardiac Care Unit of a tertiary care hospital (Grant Medical College & Sir JJ Group of Hospitals) in Mumbai for one year.

Inclusion criteria-

Patients of AMI having-

1. Age ≤ 65 years.
2. Chest pain for ≥ 30 minutes.
3. Time delay of < 6 hours from onset of symptoms.
4. Significant 'ST' segment elevation in 12 leads ECG-

- Anterior wall- Q wave and/or ST segment elevation of ≥ 2 mm in two consecutive leads from V_1 - V_6

- Inferior wall- Q wave and/or ST segment elevation of ≥ 1 mm in limb leads II, III, AVF.
- Multiple sites- Concomitant involvement of two areas.

Exclusion criteria-

1. Old /previous myocardial infarction.
2. Previous intervention done for IHD.
3. Contraindication for thrombolytic therapy.
4. Presence of left bundle branch block /pace rhythm.

All patients arriving in the hospital with suspected AMI were referred to ICCU after confirming the diagnosis of AMI by ECG. Then blood was collected for CPK-MB. Then Study group (Group I, n=28) patients were thrombolysed by Injection Streptokinase (STK) 1.5 million units over one hour- first half over 20 minutes and the remaining half over next 40 minutes. 90 minutes post-thrombolysis, repeat ECG and blood sample for CPK-MB was collected. Coronary angiography of all Group I patients was done within 7 days. As per previous studies in this field, the non-invasive diagnostic features of failed thrombolysis are^{4,5,6}-

1. Non- resolution of ST segment on ECG (<25-50% resolution at 90-180 minutes post thrombolysis).
2. CPK-MB ratio post/pre thrombolysis- <5 at 60 minutes & <10 at 90 minutes.

Control group (Group II, n=12) patients were those who presented late (> 6 hours) or who deserved STK but didn't receive it because of any contraindication like recent trauma, surgery, head injury, GI hemorrhage, peptic ulcer disease, previous treatment with or allergy to STK, stroke within last 6 months or bleeding diathesis. They were treated by anticoagulants and ECG & CPK-MB were assessed after that. These parameters of both the groups were compared.

Further, in the study group, results of >50% ST segment resolution and Post/Pre CPK-MB ratio ≥ 10 was compared with TIMI Grade III Coronary blood flow after angiography, to see the percentage of patients who underwent successful thrombolysis.

TIMI grading³-

Grade 0- Complete occlusion of IRA.

Grade I- Some penetration of the contrast material beyond the point of obstruction but without perfusion of distal coronary bed.

Grade II- Perfusion of entire IRA into the distal bed but with delayed flow compared to the normal artery.

Grade III- Full perfusion of IRA with normal flow. Grade III flow is the goal of reperfusion therapy.

OBSERVATIONS & RESULTS

Table 1: Age distribution

Age in years	Group I (n= 28)		Group II (n= 12)		Total (n= 40)	
	No	%	No	%	No	%
<40	7	25.0	0	0	7	17.5
40-49	8	28.6	6	50.0	14	35.0
50-59	8	28.6	5	40.0	13	13.0
60-65	5	17.9	1	10.0	6	6.0

This table shows that though maximum patients in the study group were > 40 years of age, still 25% of them were < 40 years. Among all, 35% were in their 4th decade.

Table 2: Territory of MI involved

Territory involved	Group I (n= 28)		Group II (n= 12)		Total (n= 40)	
	No	%	No	%	No	%
Anterior	17	60.7	7	58.3	24	60
Inferior	8	28.6	4	33.3	12	30
Multiple	3	10.7	1	8.4	4	4

So, out of 40 patients-

- 60% patients had AWTMI, 58.3% of which were in non-STK and 60.7% in STK group.
- 30% had IWMI, 33.3% of which were in non-STK and 28.6% in STK group.
- 10% had multiple area involvement, 8.4% of which were in non-STK and 10.7% in STK group.

Table 3: >50% resolution of ST segment (ECG Criteria)

Territory involved	Study/Group I (n= 28)			Control/Group II (n= 12)		
	No of cases with AMI	No of cases with >50% resolution	%	No of cases with AMI	No of cases with >50% resolution	%
Anterior	17	10	63.5	7	2	28.5
Inferior	8	5	64.5	4	1	25.0
Multiple	3	1	33.3	1	0	0.0
Total	28	16	57.1	12	3	25.0

In Study/Group I-

- 57.1% showed >50% resolution of ST segment. It means in 42.9% of patients thrombolysis was failed.
- Among AWTMI patients, 63.5%, among IWMI patients, 64.5% and among patients with multiple area involvement, 33.3% showed >50% resolution of ST segment.

In Control/Group II-

- 25% showed >50% resolution of ST segment. It means in 75% of patients anticoagulation was failed
- Among AWTMI patients, 28.5%, among IWMI patients, 25.0% and among patients with multiple area involvement, none of the patients showed >50% resolution of ST segment.

Table 4: Post/Pre thrombolysis or anticoagulation CPK-MB Ratio (Cardiac enzyme Criteria)

Territory involved	Study/Group I (n= 28)			Control/Group II (n= 12)		
	No of cases with AMI	No of cases with CPK-MB ratio ≥10	%	No of cases with AMI	No of cases with CPK-MB ratio ≥10	%
Anterior	17	11	64.6	7	1	14.5
Inferior	8	6	66.5	4	1	25.0
Multiple	3	1	33.3	1	0	0.0
Total	28	18	64.3	12	2	16.6

In Study/Group I-

64.3% showed ≥10 times rise in CPK-MB after thrombolysis. It means in 35.7% of patients thrombolysis was failed

- Among AWTMI patients, 64.6%, among IWMI patients, 66.5% and among patients with multiple area involvement 33.3% showed ≥10 times rise in CPK-MB after thrombolysis.

In Control/Group II-

- 16.6% showed ≥10 times rise in CPK-MB post-treatment. It means in 83.4% of patients anticoagulation was failed.
- Among AWTMI patients, 14.5%, among IWMI patients, 25.0% and among patients with multiple area involvement, none showed ≥10 times rise in CPK-MB post-treatment.

Table 5: TIMI Grade III Coronary blood flow after angiography in study group (n=28)

Territory involved	Number of patients	TIMI III flow achieved	%
Anterior	17	9	52.9
Inferior	8	4	50.0
Multiple	3	1	33.3
Total	28	14	50.0

This means,

- 50% patients showed TIMI Grade III Coronary blood flow in angiography in study group, while 50% failed to do so.

Table 6: Summary of all indicators of successful thrombolysis

Indicators of successful thrombolysis	Study group (n=28)	
	Number	%
>50% ST segment resolution	16	57.1
Post/Pre CPK-MB Ratio ≥10	18	64.3
Angiography with TIMI III	14	50.0

DISCUSSION

Over last three decades, the management of AMI has been revolutionized with the use of thrombolytic agents. Among all, Streptokinase is used in this study because it is the cheapest one. Two out of 28 patients receiving STK suffered allergic reaction and one had hypotension. In this study, 60% patients had AWTMI, 30% had IWMI and 10% had multiple area involvement. According to a study done by Rao et al in 2012, AWTMI was seen in 70% and IWMI in 30% of patients with failed thrombolysis. There was a trend towards higher occurrence of failed thrombolysis in AWTMI and successful thrombolysis in IWMI. In the study group, 57.1% showed >50% resolution of ST segment and 64.3% showed ≥10 times rise in CPK-MB after thrombolysis. While in the control group, only 25% showed >50% resolution of ST segment and 16.6% showed ≥10 times rise in CPK-MB after anticoagulation. Regarding confirmation of successful

thrombolysis after angiography, 50% patients of study group showed TIMI Grade III Coronary blood flow while 50% failed to do so. The pre to post thrombolysis ECG has been described as having reasonable sensitivity and specificity, irrespective of the infarct site. The rapid peaking of cardiac enzymes over 3 h post-thrombolysis has revealed very high (94%) sensitivity as well as specificity (100%) in this situation.7,8,9,10

CONCLUSION

To conclude, careful clinical observation of symptoms, with frequent clinical assessment and determination of resolution of ECG at 90 minutes and the ratios of serum levels of CPK-MB at 90 minutes to prethrombolytic values seem to be a realistic strategy for assessing reperfusion failure. Such patients could then be considered for repeat thrombolysis or intervention.

LIMITATIONS OF THE STUDY

1. Streptokinase was used as many patients couldn't afford other expensive agents.
2. It was done on a small number of patients, can be extended on a larger population.

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