

**CLINICAL IMPACTS OF ST- SEGMENT NON-RESOLUTION AFTER
THROMBOLYSIS FOR MYOCARDIAL INFARCTION**¹*Dr. Kiran Yadav and ²Dr. Ranjana Mandal^{1,2}Senior Resident, Department of General Medicine, Shyam Shah Medical College and Sanjay Gandhi Memorial Hospital, Rewa.***Corresponding Author: Dr. Kiran Yadav**

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ABSTRACT

Objectives: We investigated the clinical consequences of non-resolution of the ST segment after thrombolytic therapy for acute ST-elevation myocardial infarction, in 100 consecutive patients admitted to a coronary care unit. Failed thrombolysis was defined as <50% ST-segment resolution at 90 minutes after the start of thrombolytic treatment. Outcomes were measured in terms of in hospital adverse events and mortality at 6 weeks. **Material And Methods:** A total of 100 patients with first episode of ST elevation myocardial infarction without any conventional contraindication for thrombolysis were taken for the study. % of ST segment resolution after 90 min of thrombolysis was calculated and correlation with Ttn, ejection fraction, arrhythmia, prognosis in the patients with acute Myocardial Infarction. **Results:** Out of 100 patients who were thrombolysed, 30% had failed thrombolysis. Patient who presented within 6 hours of chest pain had 7.7% failed thrombolysis which was significantly lower than patients who presented >6 hrs of chest pain with 44.5% failure rate, p value 0.0002. patients with positive troponin T on admission were having high thrombolysis failure 40.8% as compared to 17.4% failure rate in patients with negative troponin T on admission p value 0.0203. **Conclusion:** Long symptom to needle time is an important predictor of failed thrombolysis in acute myocardial infarction patients. 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.

KEYWORDS: Acute Coronary Syndrome (CAD), ST segment elevation, ST segment resolution, Thrombolysis.**1. INTRODUCTION**

Coronary heart disease (CHD) is a major cause of mortality and morbidity all over the world. According to a report of World Health Organization (WHO) in 2005, cardiovascular disease (CVD) caused 17.5 million (30%) of the 58 million deaths that occurred worldwide.^[1] Acute myocardial infarction is one of the most common diagnoses in hospitalised patients in industrialized countries.^[2] 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.^[3]

The thrombolytic therapy is the main mode of reperfusion in developing countries like India.⁴The acute coronary syndromes include unstable angina, ST segment elevation myocardial infarction (STEMI), non-ST segment elevation myocardial infarction (NSTEMI).⁵ Analysis of ST segment resolution on ECG, after fibrinolytic therapy, in cases of STEMI offers an attractive and cost-effective solution to assess coronary reperfusion.^[6]

2. MATERIALS AND METHODS

100 cases of acute ST elevation Myocardial infarction were taken for the study admitted between March 2015 to May 2016. Patients were taken from ICCU of department of medicine S.S. Medical College and S.G.M. Hospital Rewa (M.P.).

Selection Criteria**Inclusion criteria**

1. Symptoms of acute myocardial infarction within 6 h of onset of chest pain
2. STEMI, is defined as new ST elevation at the J point in at least 2 contiguous leads of ≥ 2 mm (0.2 mV) or more in men >45 years or ≥ 0.25 mV in men <45 years or ≥ 1.5 mm (0.15 mV) in women in leads V2-V3 and/or 1 mm (0.1 mV) or more in other contiguous limb leads
3. Age ≥ 18 years.

Exclusion Criteria

1. Late thrombolysis (> 12 hrs from onset of pain)
2. Recurrent MI
3. Presence of left bundle branch block
4. Development of pericarditis

5. Age <18 years.
6. Patients with conventional contraindications for thrombolytic therapy.
7. Patients with previous history of valvular heart disease, cardiomyopathy and congenital heart disease.
8. If patient dies before 90 minutes after thrombolytic therapy.
9. Other causes of ST segment elevation.

In patients with acute MI after considering inclusion and exclusion criteria, history and clinical examination done.

Baselineserial ECG at 1hr,2 hr and cardiac enzymes-troponin T was analysed with the third-generation tnt assay on an Elecsys 2010 with a detection limit of 0.01µg/l. other investigations (RBS, Lipid Profile, RFT, CBC) were done.

Patients are assigned to successful/ failed thrombolysis is based on ECG taken 90 minutes after thrombolysis. Failed thrombolysis is considered if there is less than 50% ST segment resolution in the single lead showing maximum ST segment at baseline ECG.

Statistical analysis

Continuous data were expressed as mean \pm SD and median and analyzed by unpaired t test. Categorical data are presented as numbers and percentages, were analyzed by chi-square test.

p value of 0.05 or less was considered as statistically significant.

3. OBSERVATIONS AND RESULTS

Table -1: Distribution of cases according to Age.

Age Groups (years)	Males	%	Females	%	Total
21-30	1	1.2	1	4.7	1
31-40	4	5.0	1	4.7	5
41-50	19	24	3	14.2	21
51-60	29	36.7	4	19	33
61-70	15	18.9	8	38	23
71-80	8	10.1	3	19	12
>80	3	3.7	1	4.7	4
Total	79		21		100

$$\chi^2 = 6.237$$

$$P \text{ value } 0.3972$$

Above table reveals that among males, maximum patients were in the age group 51-60 yrs followed by 41-

50 yrs. Among females, maximum patients were in the age group 61 – 70 yrs, followed by 51 – 60 yrs.

Table 2: Risk factors inMI(n=50).

Showing Past History	No. of Cases	Percentage
Diabetes Mellitus	22	44
Hypertension	21	42
Ischemic Heart Disease	7	14
Total	50	100.0

This table shows that out of 100 patients, 22 were diabetics, 21 were hypertensives and 7 were having prior ischaemic heart disease.

Table 3: Thrombolysis in relation to time of onset of MI (n=100).

	Successful thrombolysis(n=70)		Failed thrombolysis (n=30)	
	No.	%	No.	%
Time to thrombolysed <6hrs	36	92.3	3	7.7
Time to thrombolysed >6hrs	34	55.7	27	44.3

$$\chi^2 = 13.459$$

$$P \text{ value } 0.0002 \text{ (highly significant)}$$

Above table shows that patients who were thrombolysed within 6 hrshad 7.7% failed thrombolysis as compared to

patients who were thrombolysed >6 hrs who had 44.3% failed thrombolysis.

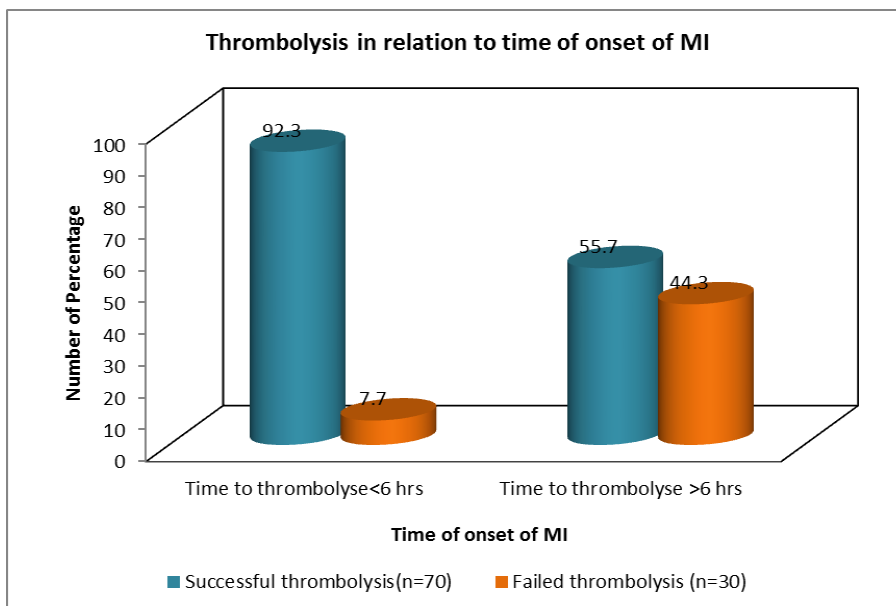


Table -3: Co-relation of troponin T on admission with thrombolysis failure.

	Successful thrombolysis (n=70)		Failed Thrombolysis (n=30)	
	No.	%	No.	%
TroponinT positive	32	59.2	22	40.8
TroponinT T negative	38	82.6	8	17.4

$\chi^2 = 5.385$

p value 0.0203(Highly significant)

Above table shows that patients with positive troponin T on admission were having high thrombolysis failure

40.8% as compared to 17.4% failure rate in patients with negative troponin T on admission.

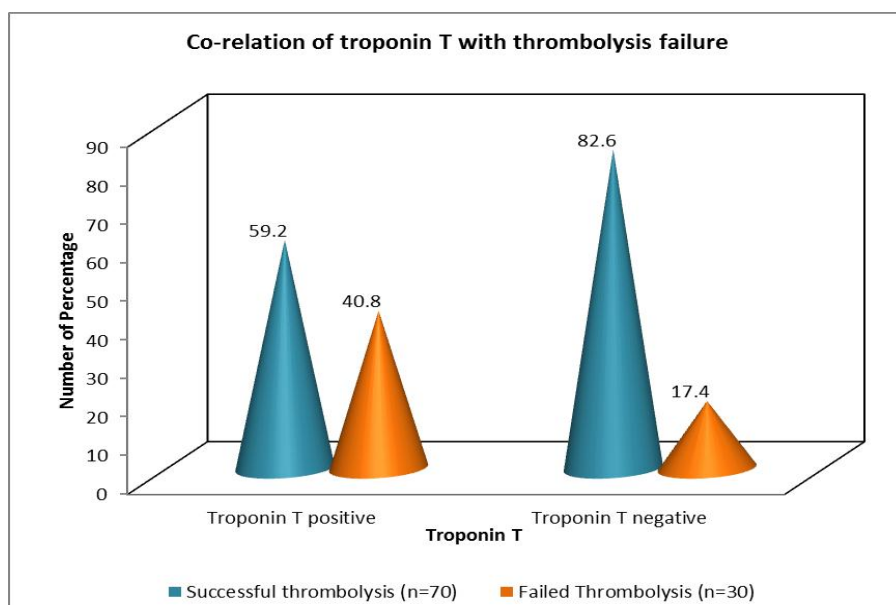


Table -4: Site of MI.

Site of MI	No. of Cases	Percentage
AWMI	57	57.0%
IWMI	40	40.0%
LWMI	03	3.0%
Total	100	100.0

Above table shows that 57 patients were AWMI, 40 were having IWMI, 3 were having LWMI.

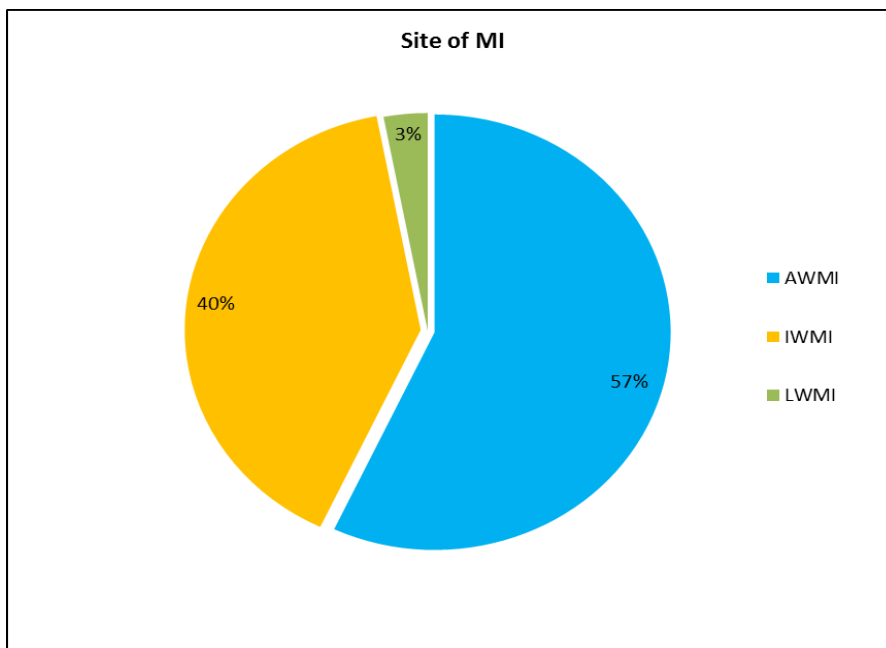


Table -5: Mortality in failed thrombolysis.

	Successful thrombolysis (n=70)		Failed Thrombolysis (n=30)	
	No.	%	No.	%
Survivors	68	75.5%	22	24.5%
Mortality	2	20%	8	80%

$\chi^2 = 10.714$ P value 0.0011 (significant)

Above table shows that among patients who survived, 75.5% had successful thrombolysis and 24.5% had failed thrombolysis. Among patients who died after

thrombolysis, 20% had successful thrombolysis and 80% had failed thrombolysis.

Table 6: Mortality in AWMI (n=57).

	Successful Thrombolysis(38;66.5%)		Failed Thrombolysis(19; 33.5%)	
	No.	%	No.	%
Survivors	37	72.5%	14	27.5%
Mortality	1	16.6%	5	83.4%

$\chi^2 = 5.239$ P value 0.0221 (significant)

Above table shows mortality among AWMI patients. Among patients who survived, 72.5% had successful thrombolysis and 27.5% had failed thrombolysis. Among

patients who died after thrombolysis 83.4% had failed thrombolysis and 16.6% had successful thrombolysis.

Table 7: Mortality in IWMI (n=40).

	Successful thrombolysis(31;77.5%)		Failed thrombolysis (9;22.5%)	
	No.	%	No.	%
Survivors	30	83.3%	6	16.7%
Mortality	1	25%	3	75%

$\chi^2 = 4.078$ P value 0.0434 (significant)

Above table shows mortality in IWMI patients. Among patients who survived, 83.3% had successful thrombolysis and 16.7% had failed thrombolysis. Among

patients who died after thrombolysis 75% had failed thrombolysis and 25% had successful thrombolysis.

Table 8: Co-relation of Ejection Fraction with thrombolysis(n=100).

	Successful Thrombolysis(70)	Failed Thrombolysis(30)
Mean ejection fraction	46.61±13.470	28.18±11.91

P value <0.0001(extremely significant)

Above table shows that mean ejection fraction was 46.61±13.47 among successfully thrombolysed patients which was higher than patients who had failed thrombolysis 28.18±11.91.

4. DISCUSSION

We have studied the extent of failed thrombolysis and successful thrombolysis. It depends on the ECG criteria used for failed thrombolysis, drug used and inclusion and exclusion criteria used in a particular study. In present study failed thrombolysis was observed in 30% patients using ≤50% maximum ST segment resolution at 90 min post thrombolysis as criteria.

Richardson *et al*(1988)⁷ used similar criteria and drug and observed 44% failed thrombolysis. **Purcell *et al*(1997)⁸** who used 120min ECG post thrombolysis with streptokinase and **Katyalet *al*(2003)⁹** who used < 30% at 90min as criteria observed 34% failed thrombolysis.

Time From Onset Of Symptoms To Thrombolysis

In the present study, 39 patients came to hospital within 6 hours from the onset of chest pain, out of which 36 (92.3%) patients have successful thrombolysis and 3 (7.7%) have failed thrombolysis. 61 patients came to hospital after 6 hours, out of which 34 (55.7%) patients were successfully thrombolysed and 27 (44.3%) patients have failed thrombolysis, p value 0.0002.

This observation is in concordance with **Kharash *et al*(1996).¹⁰** who concluded that shorter the time lag between onset of pain and treatment the better are the results.

Keeley *et al.* (2003) Late presentation is an important risk factor for failed thrombolysis in AMI. Persistence of chest pain and non-resolution of reciprocal ST depression are significantly associated with failed thrombolysis.¹¹

GISSI-2(1990)¹² showed significantly higher proportion of successful thrombolysis in patients presenting within 3 hours.

Thrombolytic Agent

In the present study, 91 patients were thrombolysed with Streptokinase, 4 with Urokinase and 5 with Tenecteplase. Among the patients who were thrombolysed with streptokinase 33.70% have failed thrombolysis p value 0.0934. All the patients who were thrombolysed with tenecteplase and urokinase have successful thrombolysis.

Lee *et al*(2008),¹³ showed streptokinase had a failure rate (56.8%) Streptokinase is the first generation

thrombolytic agent. It acts by complexing with plasminogen and it is not fibrin specific.

Mortality In Mi Patients

In the present study, 100 patients were thrombolysed. This study has 10% (10 patients) mortality, out of which 80% have failed and 20% have successful thrombolysis. P value = 0.0011.

In the present study, AWTMI was seen in 57 patients. successful thrombolysis was seen in 66.5%(38 patients) of AWTMI patients and 33.5% (19 patients) have failed thrombolysis, with 10.5% (6 patient) mortality, P value=0.0221 In the present study, patients with failed thrombolysis have mean ejection fraction 28.28 ±11.91 and patients with successful thrombolysis have 46.61 ± 13.470. In our study, 10 patients have mortality in this study with mean ejection fraction 29.9 ± 19.22. Mean Killip class in successfully thrombolysed patients was 1.231 ± 0.5835 and failed group was 1.46 ± 0.9685. In this study, there is 10% (10 patients) mortality in which Mean Killip class was 1.7 ± 1.3375.

In AWTMI patients, Mean Killip class was 1.263 ± 0.554 and 1.473 ± 1.0173 in successfully and failed thrombolysis patients. There was 10.5%(6 patients) mortality who had Mean Killip class 1.66 ± 1.3784

In IWTMI patients, Mean Killip class was 1.0833 ± 0.3586 and 1 ± 0.3333 in successfully and failed thrombolysis patients. There was 10% (4 patients) mortality who had Mean Killip class 2 ± 1.4121.

GISSI –2 (1990)¹⁴ observed that higher the Killip class, more the extent of failed thrombolysis.

Arrhythmia In Mi

In the present study, among 100 patients 14% had VPCs, 17% had AIVR, 6% had Sinus Bradycardia, 4% had RBBB, 5% had VT, 1% had AF.

Goldberg *et. al* concluded that the incidence of AF after AMI was 13.7% and 5- 23% respectively.¹⁵

Right bundle branch block was associated with anterior MI in the present study. This is comparable to the findings of HERO-II trial.⁹⁶

Ventricular tachycardia was in 5% of the patients. One of them had NSVT (17%), which is comparable to that reported by Cheema *et. al* (10%).¹⁶

Accelerated idioventricular rhythm was present in 17% of the patients whereas according to Libby and Wagner(2007), it is seen in upto 20% of the patients.^{17,18}

5. CONCLUSION

Long symptom to needle time is an important predictor of failed thrombolysis in acute myocardial infarction patients. 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.

In present study failed thrombolysis was observed in 30% patients using $\leq 50\%$ maximum ST segment resolution at 90 min post thrombolysis as criteria.

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