



COMPARATIVE CLINICAL AND ANGIOGRAPHIC PROFILE OF SUCCESSFUL AND FAILED LYSIS OF STEMI PATIENTS

Cardiology

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ABSTRACT

Background: Acute Myocardial Infarction (MI) is one of the leading causes of death throughout the world. Currently the primary management guideline of myocardial infarction is primary Per Cutaneous Intervention (PCI). Thrombolysis with intravenous fibrinolytic therapy is an important reperfusion strategy, especially when primary PCI cannot be offered. Although thrombolysis is commonly performed, the procedure is often prone for failures. This study was done to explore the reasons for the failure in the given situation, and an adequate analysis of the failed thrombolysis exploring the factors which significantly play the role in the success of thrombolysis. **Methods:** This observational cross-sectional study was carried out among 390 patients who got admitted to our tertiary care hospital, Madras Medical College, RGGGH, with STEMI diagnosis and thrombolysed patients were included for this study. Patients who were contraindicated for thrombolysis were excluded from the study. A 12 lead ECG was done before and 60 minutes after thrombolysis. Echocardiogram was done to assess left ventricle function. Coronary angiogram to assess for the type and extent of lesions and number of vessels involved. **Results:** In the study group of 390 patients, 193 patients belong to successful thrombolysis group (49.5%) and 197 patients belong to failed thrombolysis group (50.5%). Study group presented with time window less than 3 hours had more successful lysis than other groups. ($P < 0.0001$). Diabetes increase the risk of thrombolysis failure ($p = 0.018$). A higher degree of LV systolic dysfunction was more common in patients with failed thrombolysis. Type B and Type C lesions in the infarct-related artery were more common in patients with failed thrombolysis ($P < 0.0001$). Less than T.I.M.I. 3 flow was seen in patients with failed thrombolysis ($p < 0.001$). Study group with multivessel disease had more failed lysis than other groups ($P < 0.0001$). **Conclusions:** Successful thrombolysis was seen in the study group presented with time window less than 3 hours. Failed thrombolysis was common in patients with diabetes. And multivessel disease, higher degree of LV systolic dysfunction, type B and C lesions had more failed thrombolysis. This study reiterates the importance of early thrombolysis for effective clinical outcomes.

KEYWORDS

Successful And Failed Thrombolysis, Coronary Angiogram

INTRODUCTION

Acute myocardial infarction is one of the leading cause of the death worldwide. In India, prevalence of Coronary artery disease (CAD) has been progressively increased in India, i.e., two times higher (10%) in urban than in rural India [11,15]. Most commonly used treatment in acute myocardial infarction was thrombolysis.

The patency rate and T.I.M.I flow after thrombolysis is based on, either a fibrin specific or non-specific agent and several other factors predicted the response to thrombolytics. (12) The available thrombolytics have patency rates were around 85%. [21]. More than one-third of the patients who undergo thrombolysis develop spontaneous recanalization within 12 to 24 hours and shown to decrease the mortality by 50% [22].

Current guidelines regarding the primary management of myocardial infarction is primary Per Cutaneous Intervention (PCI). PCI done in patients with patent artery has better prognosis than patients with occluded vessels [3,8-10]. Fibrinolysis shown to improve both the short term and long term survival. [19,20].

More than the thrombolytic agent used, the time between the onset of MI and health care access plays a crucial role. For every 30 - minute delay increases the relative risk of 1 yr mortality by 8 times. The ultimate goal of reperfusion in acute MI is tissue perfusion, whether due to primary coronary intervention or fibrinolytic therapy. Evidence exists on infarct-related arteries as a key determinant to knowing that reperfusion outcome is accomplished by fibrinolytic or PCI [16-18]. This study analysis the various factors associated with failed thrombolysis by coronary angiographic profile. This study compares and contrast the coronary angiographic profile of patients with successful and failed thrombolysis with streptokinase.

OBJECTIVES

1. To assess the risk factors of successful and failed thrombolysis.
2. To access the angiographic lesion characteristic in patients with failed thrombolysis, in comparison with patients with successful thrombolysis.
3. To assess for any predilection of an infarct artery for successful or failed thrombolysis.

METHODOLOGY

Study Design

This study was a single centre cross sectional study in our Department of Cardiology of our tertiary care hospital for a period between January 2020 and October 2020.

Study Population

A total of 390 patients who got admitted at our tertiary care hospital with a diagnosis of ST segment elevation MI and thrombolysed during the study period were included in this study based on inclusion and exclusion criteria.

Inclusion Criteria

Based on electrocardiographic diagnosis of acute myocardial infarction.

Exclusion Criteria

1. Patients who have contraindications for thrombolysis.
2. Patients who died within 1 hour of streptokinase thrombolysis
3. Patients with old myocardial infarction history.
4. Patients with STEMI associated with left bundle branch block.
5. Patients with chronic kidney disease or with any other systemic contraindications for coronary angiogram.

Operational Definition

Patients with electrocardiographic evidence of ST segment elevation MI and thrombolysed with streptokinase were included in this study. Patients categorised as successful thrombolysis based on more than 50% ST segment resolution in the lead with maximum ST elevation from the time of presentation to 60 minutes after thrombolysis and with resolution of chest pain. And patients categorised as failed thrombolysis based on ST elevation failed to show greater than 50% resolution at 60 minutes after the thrombolysis and with persistent chest pain. Significant coronary artery disease is considered on coronary angiogram based on the diameter of stenosis if more than 50% compared to the normal vessel luminal diameter.

Data Collection

Data collected include the history regarding onset of pain and the time of presentation to the hospital, including the risk factors for coronary heart disease and the treatment history, history of any systemic diseases

were also taken. 12 lead Electrocardiography (ECG) taken initially at the time of presentation. Repeat ECG's were taken after 60 minutes of initiation of thrombolysis. On the basis of ECG patients were classified as anterior wall MI and inferior wall MI depending on the location of ST segment elevation. Thrombolysis was initiated with 15 lakh units of streptokinase infusion over 1 hour and 60 minutes after thrombolysis a repeat ECG was taken. Echocardiographic assessment of LV function was done for all patient. Patients were classified as normal mild, moderate and severe LV dysfunctions based on the ejection fraction. All the patients were undergone coronary angiogram. The angiogram was performed within 48 to 72 hours of admission. It was done by a trained consultant cardiologist. Pre -procedure guidelines were followed , and coronary angiogram was done by radial or femoral route. Standard 6F Judkins 3.5 or 4 Judkins left and right catheter was used to engage left coronary artery and right coronary artery respectively or 5F TIG catheter was used. Optimal angiographic views taken to evaluate the lesion characteristics and were visualized after iodine contrast injection.

Data Analysis

Data was entered and analysed using software SPSS version 10. Percentages were used to compute the prevalence of successful and failed thrombolysis. The difference in the outcome between the successful and failed thrombolysis groups was considered statistically significant if $P \leq 0.05$.

RESULTS

A total of 390 patients included in this study were statistically analysed. Out of the total 390 patients in this study, 193 patients belong to successful thrombolysis group and 197 patients belong to the failed thrombolysis group. Clinical variables of both study participants are given in table. Study group with age < 40 years had more successful lysis than other two age groups which was statistically significant ($p = 0.005$)

Table1: Clinical variables of study groups

S.NO	Clinical variable	Successful thrombolysis (total-193) n(%)	Failed thrombolysis (total-197) n(%)	p value
1.	Age(years)			
	<40	43(22.27)	22(11.1)	
	40-60	119(61.65)	127(64.4)	$p=0.005$
	>60	31(16.06)	48(24.36)	
2.	Sex			
	Male	166(86.01)	163(82.74)	$p=0.405$
	Female	27(13.98)	34(17.25)	
3.	Diabetes			
	Present	71(36.78)	86(43.65)	$p=0.018$
	Absent	122(63.21)	111(56.34)	
4.	Hypertension			
	Present	50(25.90)	58(29.44)	$p=0.497$
	Absent	143(74.09)	139(70.55)	
5.	Smoker			
	Yes	64(33.16)	69(35.02)	$p=0.749$
	No	129(66.83)	128(64.97)	
6.	Alcohol			
	Yes	72(37.30)	59(29.94)	$p=0.134$
	No	121(62.69)	138(70.05)	

Failure of thrombolysis in diabetic population as compared to non-diabetic population was statically significant with a p value of (0.018). Among 133 smokers, 64 patients had successful thrombolysis, and 69 patients had failed thrombolysis and this difference between the two groups was not statistically significant.

Table2: Diagnosis and Time to thrombolysis of study groups

S.NO	Clinical variable	Successful thrombolysis (total-193) n(%)	Failed thrombolysis (total-197) n(%)	p value
1.	Diagnosis(MI)			
	AWMI	106(54.92)	110(55.83)	
	IWMI	83(43.00)	81(41.11)	$p=0.91$
	PWMI	10(5.1)	2(1.01)	
	HLWMI	3(1.55)	4(2.03)	
2.	Time to thrombolysis			
	< 3hours	28(14.50)	0(0)	$p<0.0001$
	3 to 6 hours	99(51.29)	126(63.95)	
	>6hours	66(34.19)	71(36.04)	

The characteristics regarding type of myocardial infarction and time to thrombolysis are given in (table2) Study population who presented with time window of less than 3 hours had more successful lysis than other groups which was statistically significant ($P < 0.0001$). Region of MI had no significant effect on the success of the lysis.

Echocardiographic features of both the study groups are given in (Table 3). A higher degree of LV dysfunction was more common in patients of failed thrombolysis (25 patients) than in patients with successful thrombolysis(5 patients) with a ($P < 0.0001$) which was statistically significant.

Table 3:Echocardiographic features of study groups

S.NO	Clinical variable	Successful thrombolysis (total-193) n(%)	Failed thrombolysis (total-197) n(%)	p value
1.	Ejection fraction			
	<35%	5(2.59)	25(12.69)	
	35-44%	28(14.50)	98(49.74)	
	45-54%	112(58.03)	72(36.54)	$p<0.0001$
	>55%	48(24.87)	2(1.01)	

The angiographic findings of study groups shown in (Table 4). Study population with type A lesion had more successful lysis (150 patients) than the failed lysis (64 patients) group which was statistically significant ($P < 0.0001$), and type C lesion had more failed lysis which was statistically significant. Type B is commonest lesion among the failed lysis group. 185 patients had T.I.M.I 3 flow and among them, 158 patients (85.4%) had successful thrombolysis, and six patients (14.59%) had failed thrombolysis with a statistically significant P value of <0.001.

Table 4:Angiographic variables of study groups

S.NO	Angiographic variable	Successful thrombolysis (total-193) n(%)	Failed thrombolysis (total-197) n(%)	p value
1.	No. of vessels			
	Recanalized	64(33.16)	0(0)	
	MVD	59(30.56)	100(50.76)	$P<0.0001$
	SVD	70(36.26)	97(49.23)	
2.	Lesion type			
	A	150(77.72)	64(32.48)	
	B	41(21.24)	82(41.62)	$p<0.0001$
	C	2(1.03)	51(25.88)	
3.	TIMI FLOW			
	3	158(81.86)	27(13.70)	
	2	14(7.25)	54(27.41)	$p<0.0001$
	1	9(4.66)	95(48.22)	
	0	12(6.21)	21(10.65)	

DISCUSSION

In the study population the prevalence of successful thrombolysis was 49.5% and the prevalence of failed thrombolysis was 50.5%. Prevalence of failed lysis is different among various studies, with range from about 25% to 45%. In Richardson S.G, et al.[5], study 44% had failed thrombolysis. In Katyal, et al.,[7] study the prevalence of failed thrombolysis was about 34%.

In this study, patients with age group < 40 years had more successful lysis than the other two age groups which was statistically significant ($p = 0.005$). In a study by S.S Iyengar et al. ,success rate was significantly lower in age group above 70 years. Majority of this study population (84%) were males, 16% were females and no significant difference is found between males and females in successful and failed lysis group. The gender variable comparison is similar to S.S.Iyengar et al study.

In this study, diabetes was found to be a significant risk factor for failed thrombolysis. This finding correlates with the other studies by Sudhindra, et al., Samith M. Rafulah, et al.,[4-6] where failed lysis had significant association with diabetes mellitus. In this study, 46.29 % of hypertensives had successful thrombolysis, and 53.7 % had failed thrombolysis. Though hypertensives had more failed thrombolysis, but this study shows no significant difference between the hypertensive and non-hypertensive groups of the study population with reference to the successful of thrombolysis. This observation is similar with the study by S.S Iyengar et al, wherein hypertension was not significantly associated with failed lysis. In Sudhindra Rao et al.[4] study 20 % in failed thrombolysis group 16 % in the successful group had hypertension which was not statistically significant. GUSTO 1 trial's

data[17], showed higher T.I.M.I. flow in smokers compared to that of non-smokers. In this study, 48.12% of smokers had successful thrombolysis, and 51.8 % had failed thrombolysis which was not significant. In the study by S.S Iyengar et al. anterior wall myocardial infarction was associated with failed thrombolysis. In this study there is no difference is found between successful and failed lysis with respect to region of myocardial infarction.

This study demonstrated that time to thrombolysis as an important factor with respect to failure of lysis. In this study 100% of patients who presented within 3 hours had successful thrombolysis. This was significantly observed by the study done by Lee Y.Y, et al.[1] GISSI-2 trial showed that patients who present within 6 hours had better prognosis for thrombolysis. Sudhindra, et al.,[4] showed that door to needle time was more than 5 hours (5.85±2.47 hours) in failed thrombolysis while it was only 4.55±2.4 hours in the successful thrombolysis group.

In this study, patients with multivessel disease had more failed lysis than other groups which was statistically significant ($P < 0.0001$). A higher degree of LV dysfunction was more common in patients of failed thrombolysis than in patients with successful thrombolysis with a P -value of < 0.0001 which was statistically significant.

In this study, study population with type A lesion had more successful lysis than other groups which was statistically significant ($P < 0.0001$), and type C had more failed lysis which was statistically significant. In this study, out of 185 patients who had T.I.M.I 3 flow, among them, 158 patients (85.4%) had successful thrombolysis, and six patients (14.59%) had failed thrombolysis with a statistically significant P value of < 0.001 .

CONCLUSION

In this study population the prevalence of successful thrombolysis was 49.5% and the prevalence of failed thrombolysis was 50.5%. In cases of failed thrombolysis, patients most commonly presented to the hospital after 6 hours of chest pain onset. Failure of thrombolysis in diabetic population as compared to non diabetic population. A higher degree of LV dysfunction was more common in patients with failed thrombolysis. Type B and Type C lesions in the infarct-related artery were more common in patients with failed thrombolysis. Less than T.I.M.I. 3 flow was seen in patients with failed thrombolysis. With larger study and with higher participants will help in understanding the mechanisms of failed thrombolysis and thereby prognosis.

Limitations

This study was a single centre, non-randomised study with small study population. A study for a longer period and with higher number of participants would give better analysis regarding success and failed thrombolysis. And the ST changes were dynamic, hence faults may occur with interpretation.

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