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Study on Angiographic Findings of Patients Received Different Thrombolytics

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ABSTRACT ***Background:*** Treatment for acute myocardial infarction (AMI), which can be fatal, often involves thrombolytic therapy (TLT). Nevertheless, there are a number of reasons why thrombolysis does not always work. Our goal was to evaluate and contrast the coronary angiographic profiles of individuals who had undergone successful and unsuccessful thrombolysis. ***Objective:*** To determine the result angiographic findings of patients who underwent different thrombolytics. Materials and Methods: This prospective study was conducted with ST-Segment Elevated ACS patients who underwent failed thrombolysis at Department of Cardiology, Northeast Medical College, Sylhet, from January 2021 to December 2021. Ethical committee approval and informed consent were obtained from all 120 participants. Patients with acute myocardial infarction were diagnosed based on electrocardiographic evidence. Patients were categorised into successful thrombolysis if there was > 50% ST-segment resolution within 60 minutes post-thrombolysis, coupled with chest pain resolution. Failed thrombolysis included patients with a < 50% ST-segment resolution or persistent chest pain were included in this study. ***Results:*** In comparison to older age groups, younger age groups demonstrated significantly greater success with failed thrombolytics ($p<0.05$). Relationship between successful and unsuccessful thrombolytics and the ejection fraction. Fifty-five percent of ejection fractions were significantly more successful than unsuccessful thrombolytics ($p<0.05$). Type B (59%), type A (25%), and type C (16%) lesions were the most common types with unsuccessful thrombolysis. ***Conclusion:*** There was a higher frequency of effective thrombolysis than failure thrombolysis. In resource-constrained scenarios where rapid mechanical reperfusion for STEMI is not feasible, the utility of thrombolysis is reinforced. Failed thrombolysis has been linked to diabetes, anterior wall MI (LAD region), and a Type B coronary artery lesion.

Keywords: Thrombolysis, Elevated ACS, Myocardial Infarction.

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INTRODUCTION

Coronary artery disease (CAD) poses a global health challenge, necessitating optimal management of acute coronary syndrome (ACS). Despite these advancements, thrombolysis in ACS management exhibits variable efficacy, leading to instances of failed thrombolysis [1]. Acute myocardial infarction is one of the common causes of death. Worldwide, 30 - 70 % of patients with myocardial infarction receive thrombolysis as the initial treatment [2]. Understanding the coronary angiographic profile in cases of failed thrombolysis is crucial for several reasons. Firstly, it sheds light on the

extent of coronary artery involvement and the specific vessels that may be resistant to thrombolytic therapy [3]. As per AHA guidelines, the primary percutaneous coronary intervention (PPCI) is the treatment of choice for ST-elevation myocardial infarction (STEMI). To perform primary PCI, an experienced team must be on hand, since it has a greater success rate and better TIMI grade [4]. However, limited resources, affordability issues, and inadequate transportation facilities to PCI capable hospitals prevent the PCI from becoming the default reperfusion strategy, thus, making fibrinolysis the prevalent reperfusion strategy. Clinical trials have also proved that earlier fibrinolytic administration, improves myocardial salvage, preserves left ventricular function and decreases mortality and morbidity [5]. TIMI grade 3 flow was achieved more frequently in patients with an infarct-related artery other than the LAD, attributable to the fact that the myocardial territory of LAD being very large leads to extensive necrosis of the myocardium that it supplies and contributes to worse outcomes [6]. This study analyses various demographic factors associated with failed thrombolysis by coronary angiographic profile. In Bangladesh, Thrombolysis remains the main treatment as compared to Percutaneous transluminal coronary angioplasty (PTCA), and the prognosis is poor. So, through this study we intend to compare and contrast the coronary angiographic profile of patients with successful and failed thrombolysis.

MATERIALS AND METHODS

This prospective study was conducted with ST-Segment Elevated ACS patients who underwent failed thrombolysis at Department of Cardiology, Northeast Medical College, Sylhet, from January 2021 to December 2021. Ethical committee approval and informed consent were obtained from all 120 participants. Patients with acute myocardial infarction were diagnosed based on electrocardiographic evidence. Patients were categorized into successful thrombolysis if there was > 50% ST-segment resolution within 60 minutes post-thrombolysis, coupled with chest pain resolution. Failed thrombolysis included patients with a < 50% ST-segment resolution or persistent chest pain were included in this study. Patients with contraindications for thrombolysis evolved or old myocardial infarction, myocardial infarction with associated left bundle branch block, patients dying within 60 minutes of streptokinase therapy, and those with acute myocardial infarction and chronic kidney diseases preventing coronary angiography. Data collection included demographics, angiographic features, and no-reflow phenomenon. This study emphasises individualized treatment strategies based on age, cardiac conditions, and coronary anatomy, with comorbidities and lifestyle factors showing no substantial impact on outcomes. Descriptive statistics were employed for demographic profiling and comparative analyses between successful and failed thrombolysis groups in the statistical analysis, enhancing the study's precision and illuminating key distinctions in patient characteristics and outcomes.

RESULTS

Table 1 shows TIMI 3 flow was present in 37.5% (n =45) patients. Out of 45 patients with TIMI 3 flow, the risk factors such as HTN, Diabetes Mellitus, smoking, dyslipidemia, family history of coronary artery disease, and history of ischemic heart disease and prior MI were seen 18 (40%), 9 (20.0%), 18 (40%), 28 (62.22%), 11 (24.4%) and 5(11.1%) respectively. The mean duration of angina in patients with TIMI-3 flow was 4.31 ± 2.39. Normal vessel 17.78% were TIMI 3 flow and 58(77.33%) were no TIMI 3 flow ($p<0.05$). Majority 71(59%) thrombolytics were successful and 49(41%) were failed (Figure I). Age in years was significant relation with successful and failed thrombolytics. Younger age was significantly successful than older age group comparison to failed thrombolytics ($p<0.05$). Male were predominant in both successful and failed thrombolytics 67(94.37%) and 41(83.67) respectively (Table-2). Table 3 shows a substantial relationship between the ejection fraction and successful and failed thrombolytics. Compared to failed thrombolytics, 55% of ejection fractions were considerably successful ($p<0.05$). Figure 2 shows that the majority of lesions with failed thrombolysis were type B (59%), type A (25%), and type C (16%).

Table 1: Characteristics and Predictors of TIMI Flow Rates in the Study Population (N = 120)

Risk factors	TIMI flow		Total	p value
	Yes n=45	No n=75		
HTN	18 (40.0)	23 (30.67)	41	0.39
Diabetes Mellitus	9 (20.0)	11 (14.67)	20	0.45
Smoking	18 (40.0)	40 (53.3)	58	0.15
Dyslipidemia	28 (62.22)	50 (66.7)	77	0.61
F/H/O CAD	11 (24.44)	8 (10.7)	19	0.04
Past H/O IHD and prior MI	5 (11.11)	9 (12.0)	13	0.88
Coronary angiography-based ira				
LAD	15 (33.33)	44 (58.7)	59	0.007
LCx	9 (20.0)	8 (10.7)	16	0.15
RCA	22 (48.89)	23 (30.6)	45	0.04
Vessel involvement				
Normal	8 (17.78)	58 (77.33)	66	<0.001
Single vessel disease	23 (51.1)	14 (18.67)	37	0.0002
Multi vessel disease	15 (33.33)	3 (4.0)	18	<0.001
Mean angina duration	4.31 ± 2.39	5.374 ± 3.46		0.07

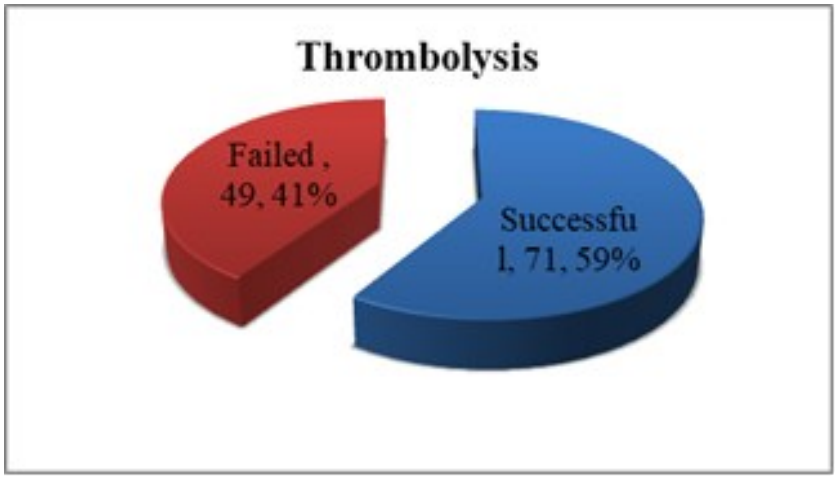

Figure 1: Pattern of Thrombolytics

Table 2: Demographic Characteristics of the Population (N=120)

	Thrombolytics		**Total**	**P value**
	Successful N=71 (%)	**Failed N=49(%)**		
Age in years				
< 40 yrs	11 (15.49)	2 (4.08)	13	0.04
40-50 yrs	35 (49.30)	18 (36.73)	53	0.17
>50 yrs	25 (35.21)	29 (59.18)	54	0.009
Mean ±SD	53.27 (±9.15)	55 (±10.72)		0.34

Sex				
Male	67 (94.37)	41 (83.67)	108	**0.05**
Female	04 (5.63)	08 (16.32)	12	

Table 3: Echocardiographic Findings of the Study Participants (N = 120).

Ejection fraction	Thrombolytics		Total	P value
	Successful n=71 (%)	Failed n=49(%)		
>55%	23 (32.39)	01 (2.04)	24	<0.001
45-54%	36(50.70)	20 (40.82)	56	0.28
35-44%	11 (15.49)	26 (53.06)	37	<0.001
<35%	01(1.41)	02 (4.08)	03	0.35

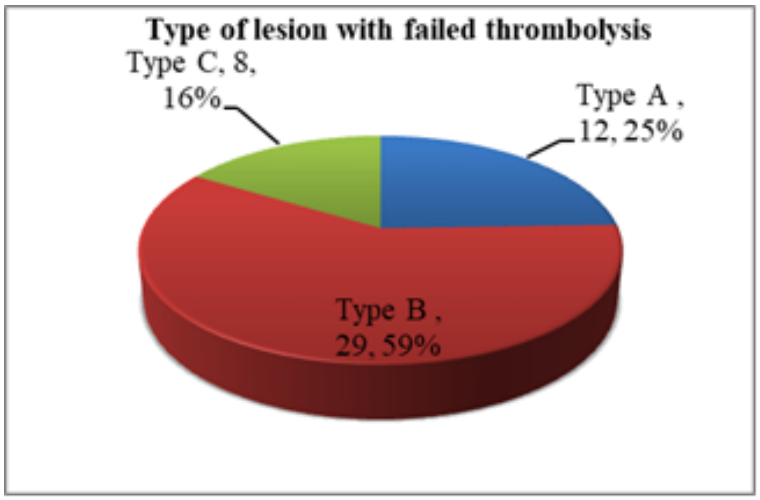

Figure 2: Type of Lesion with Failed Thrombolysis (N = 49)

DISCUSSION

In this study observed that TIMI 3 flow was present in 37.5% (n =45) patients. Out of 45 patients with TIMI 3 flow, the risk factors such as HTN, Diabetes Mellitus, smoking, dyslipidemia, family history of coronary artery disease, and history of ischemic heart disease and prior MI were seen 18 (40%), 9 (20.0%), 18 (40%), 28 (62.22%), 11 (24.4%) and 5(11.1%) respectively. The mean duration of angina in patients with TIMI-3 flow was 4.31 ± 2.39. Normal vessel 17.78% were TIMI 3 flow and 58(77.33%) were no TIMI 3 flow ($p<0.05$). Kumar *et al*. reported TIMI 3 flow was present in 36.9% (n =48) patients while 35% (n=46) patients achieved TMP 3 grade [4]. Out of 48 patients with TIMI 3 flow, the risk factors such as HTN, Diabetes Mellitus, smoking, dyslipidemia, family history of coronary artery disease, and history of ischemic heart disease and prior MI were seen 19 (39.5%), 10 (20.8%), 19 (39.5%), 30 (62.5%), 12 (25.0%) and 5(10.4%) respectively. Kadam *et al*. reported coronary Angiography was done for 450 patients [7]. Single-vessel coronary artery disease (SVCAD) was noted in 261 patients (58%), double-vessel CAD was noted in 98 patients (21.7%). Triple-vessel coronary artery disease was noted in 71 patients (15.7%). Recanalized LAD was noted in 14 patients. Recanalized RCA was noted in 4 patients. Insignificant CAD was noted in two patients. Parvathareddy *et al*. reported single vessel or multi-vessel disease's presence did not show any predilection towards successful or failed thrombolysis [8]. In contrast, based on the lesion characteristics of the infarct-related artery, it was observed that Type A lesions showed strong predilection towards successful thrombolysis, and Type B and Type C lesions showed strong predilection towards failed thrombolysis. Thrombolysis was effective in 55.38% of the patients. Overall TIMI-3 flow rates, as well as combined TIMI 2/3 flow rates, were significantly higher than prior studies which were lacking in optimal antithrombotic therapies

[6]. TIMI grade 3 flow was achieved more frequently in patients with an infarct-related artery other than the LAD, attributable to the fact that the myocardial territory of LAD being very large leads to extensive necrosis of the myocardium that it supplies and contributes to worse outcomes [6]. Kumar *et al.* reported patients with successful thrombolysis had Single vessel disease 6 (19.3%), Multivessel disease 1(3.2) [4]. It was observed that patients with diabetes mellitus had a significant rise in the number of failed thrombolysis compared to those without diabetes mellitus (p<0.005).

In this study showed the majority 71(59%) thrombolytics were successful and 49(41%) were failed. Parvathareddy *et al.* reported among them, 19 patients (54.3 %) had successful thrombolysis, and 16 patients (45.7 %) had failed thrombolysis with a P - value of 0.68, which was statistically not significant [8]. In Kumar study, 72(55.38%) of the 130 patients in the research belonged to the successful thrombolysis group, whereas 58(44.61%) belonged to the unsuccessful thrombolysis group [4]. Research by Katyal *et al*. found that 34% of thrombolysis attempts were ineffective [9]. In their investigation, Rao *et al*. observed similar outcomes [10]. However, 44% of thrombolysis failures were discovered by Richardson *et al.* which is similar to our findings [11]. According to our study, 20.8% of diabetics had failed thrombolysis. Similarly, Rao *et al*., found a substantial link between diabetes and the ST segment [10]. According to our findings, thrombolysis failure is influenced by the time it takes for thrombolysis to begin. These findings are supported by other studies, including those by Lee YY and others. A 10% increase in thrombolysis failure was seen every 60 seconds when treatment was delayed after the onset of symptoms, according to his findings [12].

Present study showed that age in years was significant relation with successful and failed thrombolytics. Younger age was significantly successful than older age group comparison to failed thrombolytics (p<0.05). Male were predominant in both successful and failed thrombolytics 67(94.37%) and 41(83.67) respectively. Kumar *et al*. showed total of 130 patients were recruited for the study with a mean age ± SD of 53.47±10.17 years [4]. There were 117 (90.0%) males and 13(10.0%) females. Current study showed substantial relationship between the ejection fraction and successful and failed thrombolytics. Compared to failed thrombolytics, 55% of ejection fractions were considerably successful (p<0.05). Kumar *et al.* [4]. Moreover, a higher ejection fraction was observed with successful thrombolysis (34.7%) while it was observed only in two patients with failed thrombolysis 2(3.4%). The observed association was significant statistically (p<0.002). In this study showed that the majority of lesions with failed thrombolysis were type B (59%), type A (25%), and type C (16%). Kumar *et al.* reported therefore, patients with anterior wall myocardial infarction had a higher percentage of patients who failed thrombolysis, which was statistically significant [4]. Patients with inferior wall MI had a higher chance of thrombolysis success. Patients with failed thrombolysis had a multivessel disease and type B lesion was more commonly seen than type A and Type C lesion in subjects with unsuccessful thrombolysis. According to several research, the percentage of failed thrombolysis ranges from 25 to 45%. Parvathareddy *et al.* reported most patients (75.9 %) with Type A lesions had successful thrombolysis and patients with Type B & C lesions (88.1 %) had failed thrombolysis (P < 0.001) [8].

CONCLUSION

In our investigation, successful thrombolysis was more common than unsuccessful thrombolysis. The usefulness of thrombolysis is reaffirmed in resource-constrained situations when timely mechanical reperfusion for STEMI is not possible. Diabetes, anterior wall MI (LAD area), and a Type B coronary artery lesion have all been associated with failed thrombolysis. Additionally, this study highlights the necessity of screening prior to starting thrombolysis. This will assist in lowering the failure rate and concentrating efforts on better treatment options.

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