ANALYSIS

24(105), September - October, 2020

ISSN
2321–7359
EISSN
2321–7367

Medical Science

The immediate outcome of thrombolytic therapy in ST-elevation myocardial infarction

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Article History
Received: 19 June 2020
Reviewed: 20/June/2020 *to* 21/July/2020
Accepted: 22 July 2020
E-publication: 28 July 2020
P-Publication: September - October 2020

Citation
Fadil Agla Bonyan, Laith G. Shareef, Assad Al-waily. The immediate outcome of thrombolytic therapy in ST-elevation myocardial infarction. *Medical Science*, 2020, 24(105), 2979-2984

ABSTRACT

Background: Plaque rupture and thrombus development play a major role in the genesis of acute coronary occlusion. The introduction of thrombolytic therapy was the main advance in the management of acute ST-elevation myocardial infarction (STEMI) since over 90 percent of such patients have complete occlusion of the culprit artery. Due in part to insufficient availability of primary PCI, fibrinolysis persists a vital therapeutic option. The earlier reperfusion occurs, the greater the benefit that can be achieved. The survival rate is elevated when thrombolytic drugs are prescribed within the first 4 hours after the onset of symptoms, especially,

within the first seventy minutes. *Objective:* To evaluate the immediate effect of fibrinolytic therapy in patients admitted to the coronary care unit with acute myocardial infarction. *Methods:* A retrospective study was carried out at Baghdad Teaching Hospital/ cardiac care unit (CCU) during the period from June 2018 – January 2019. All patients with chest pain with confirmed ST-elevation MI were included (40) patients.The patients divided into two groups: Group no.1 patients receive thrombolytic therapy within a period less than three hours from onset of chest pain, Group no. 2 patients receive thrombolytic therapy within a period between three hours to twelve hours from onset of chest pain. *Result:* A total of 40 patients who were presented with STEMI were included in this study. The patients were 31(77.5%) males and 9 (22.5%) were females. The mean age was 61.27 ± 9.47. There was a statistically significant relationship between risk factors, diabetes mellitus (P=0.004), ischemic heart disease (P= 0.029), hypertension (P=0.003), gender (P=0.011), and alcohol (P=0.033) and the occurrence of Acute myocardial infarction (AMI) and the impact of time to thrombolytic medication on outcome in patients with acute myocardial infarction. Statistical significant between thrombolytic administration and the basal crackle as a complication (P= 0.011) as a result of delay the time to delivery of fibrinolytic therapy. *Conclusion:* The most important factor in determining outcomes in patients who present with a STEMI is the time taken from onset to reperfusion. The little risk for dying through acute hospitalization period was seen for those treated with tissue plasminogen activator within two hours of acute symptoms. Elderly, women, hypertensive, and diabetic patients had longer delays at all stages. Prior infarction was an added risk factor for treatment delay.

Keywords: Thrombolytic, Fibrinolytic, Myocardial Infarction

1. INTRODUCTION

Plaque rupture and thrombus formation played a central role in the development of acute coronary occlusion. Thrombolytic agents were a leading advance in the treatment of acute ST-elevation (Q wave) myocardial infarction (STEMI) since over 90 percent of such patients have complete occlusion of the culprit artery (Anderson and Willerson, 1993, Armstrong et al., 2013). Currently in use fibrinolytic drugs act as plasminogen activators, they administered by parenteral intravenous infusion to activate the fibrinolytic pathway. These medications own a very high specificity for their substrate plasminogen and could hydrolyze a peptide bond to produce the active enzyme plasmin, which is immediately neutralized by the serine proteinase inhibitor alpha-antiplasmin, whereas fibrin-bound plasmin is protected from rapid inhibition, and finally induces clot lysis (Topol, 2001). The study aims to evaluate the immediate outcome of thrombolytic therapy in patients with acute myocardial infarction in the coronary care unit.

2. PATIENTS AND METHODS

A retrospective study was carried out at Baghdad teaching hospital (coronary care unit) during the period from June 2018 – January 2019. All patients who presented with chest pain were confirmed to has ST-elevation MI by Electrocardiography (ECG) and admitted to the coronary care unit in Baghdad Teaching Hospital were included in this study. The patients divided into two groups: Group no.1 patients receive thrombolytic therapy within a period less than three hours from start chest pain, Group no. 2 patients receive thrombolytic therapy within a period between three hours to twelve hours from start chest pain.

The patients in our study receive the first management in a casualty from registration to receiving pain killer after put canula then take a blood sample for cardiac enzyme and did for him ECG, after documentation by ECG as acase of ST-elevation myocardial infarction admit the patient at coronary care unit to give him thrombolytic therapy and further management.

3. RESULTS

A total of 40 patients, Mean age of 61.2, who were presented with STEMI were included in this study. The age, gender, chief complaints, risk factors (hypertension, DM, IHD, peripheral vascular disease, family history), and social history (alcohol and tobacco) were recorded and analyzed, Demographic and clinical data in a patient with AMI presented in Table (1). Thirty-one (77.5%) of patients were males and 9 (22.5%) were females. The mean age was 61.27 ± 9.47. There was a statistical significant between DM (P =0.004), IHD (P= 0.029), Hypertension (P=0.003), Sex (P=0.011), and alcohol (P=0.033) with the occurrence of AMI and the impact of time to thrombolytic treatment on outcome in patients with acute myocardial infarction. Significant association (P= 0.011) between thrombolytic administration and the basal crackle as complications as a result ofa delay in the time to delivery of fibrinolytic therapy. There was a statistically significant relationship between risk factors (diabetes mellitus (P =0.004), ischemic heart disease (P= 0.029), Hypertension (P=0.003), gender (P=0.011), and alcohol (P=0.033) and the occurrence of AMI. Clinical characteristics summary of the study population illustrated in Table (2). Females were less likely to receive thrombolytic therapy than males in our study (22.5%

female vs 77.5% male P =0.011). Diabetes was relatively more common in our study population, with 40% of the patients being diabetic. Table (3) and Figure (1) shows the relation between the time of administration of the fibrinolytic and resultant complications. A fourteen patient reach to casualty and receive thrombolytic within first 3hours discharge to home without complication only one death. In this study, all complications like basal crackle and pericarditis happen in the second group (receive thrombolytic 3-12h). The lowest risk for dying during acute hospitalization was seen for those treated with tPA within 3 hours of acute symptoms (7.1% vs 19.2%). The relation between gender and duration of time to reach the hospital to receive therapy were represented in Table (4) and Figure (2). All the females in our study reach a hospital for management in the 2nd window of time.

Table 1 Demographic and clinical data in a patient with AMI

Mean age	61.27 ± 9.47	P value
Gender Males Females	 31(77.5%) 9 (22.5%)	0.011
Hypertension	72%	0.003
Diabetismellites	40%	0.004
Ischemic heart disease	47%	0.029
Alcohol intake	22.5%	0.033

Table 2 Clinical characteristics of the study population	
Hours from the onset of symptoms to admission	35% Less than 3h
	65% from3-12h

Table 3 Shows the relation between the time of administration of the fibrinolytic and resultant complication

Complication	Less than 3h no. of patient14	%	From 3-12 hr no. of patient26	%	**Total**
Basal crackle	0	0	9	34.6	**22.5%**
pericarditis	0	0	3	11.5	**7.5%**
Death	1	7.1	5	19.2	**15.0%**

Table 4 The relation between gender and duration of time to reach the hospital to receive therapy.

Gender	Less than 3hr onset of symptom	%	From the 3-12hr onset of symptom	%
Male	14	45	17	55
Female	0	0	9	100

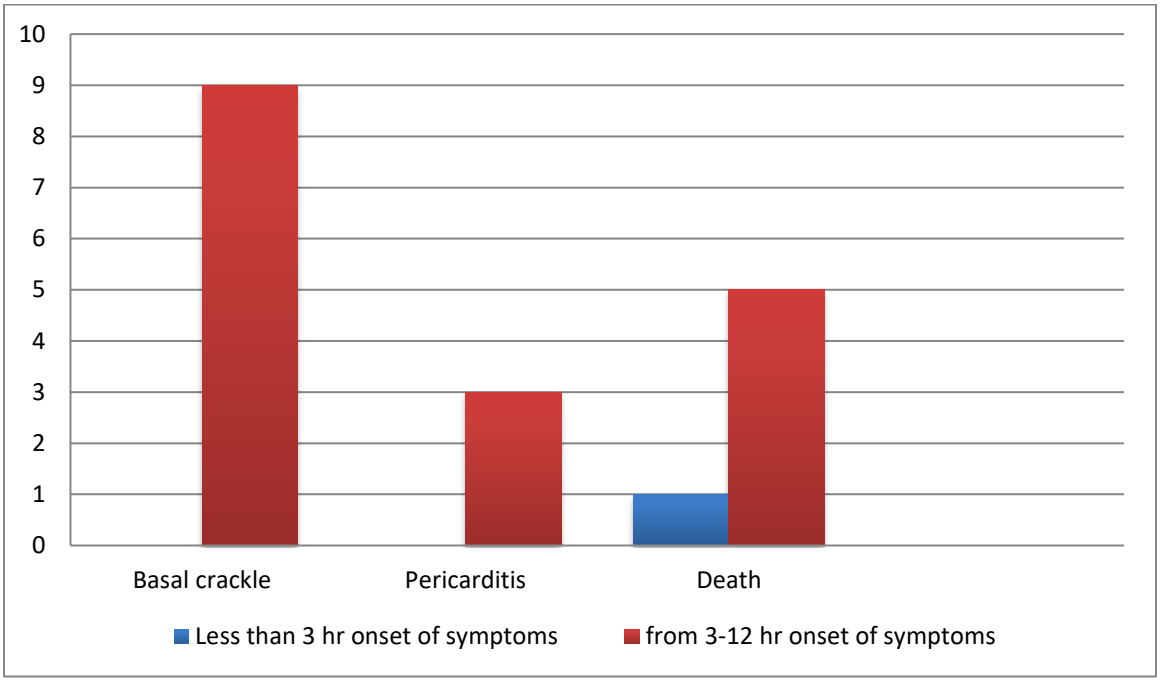

Figure 1 Shows the relation between the time of administration of the fibrinolytic and resultant complication.

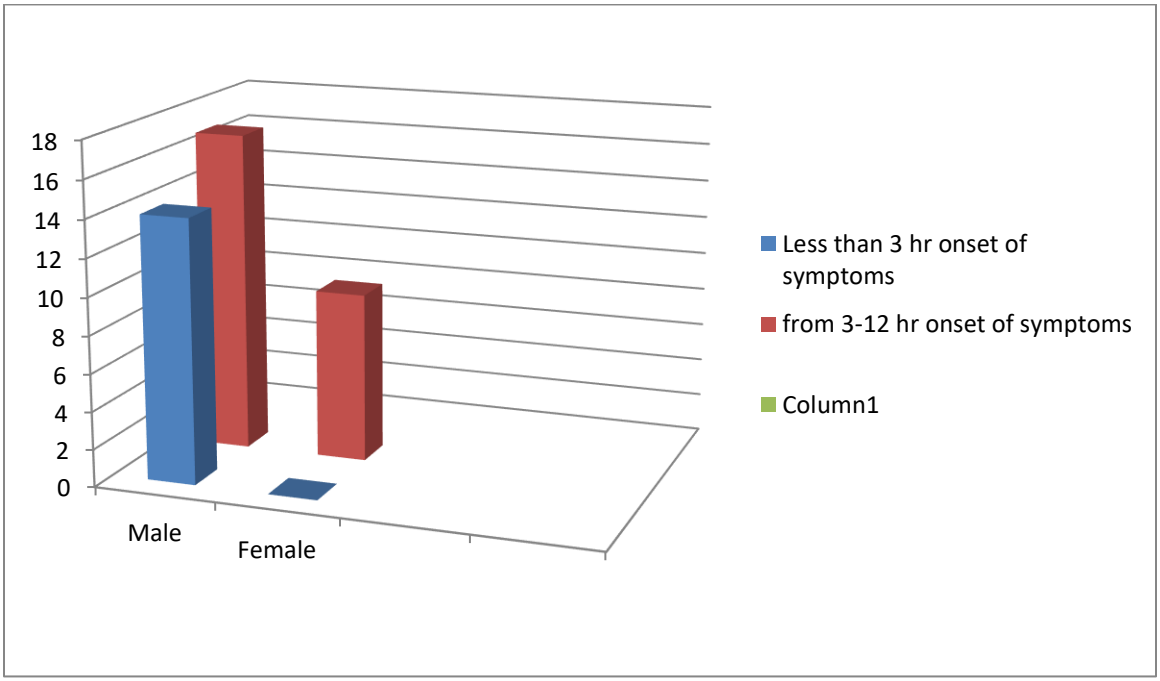

Figure 2 The relation between gender and duration of time to reach the hospital to receive therapy.

4. DISCUSSION

This study examines the immediate benefit of thrombolytic therapy in the treatment of patients with st elevation myocardial infarction. A total of 40 patients admitted in Baghdad teaching hospital (CCU) who were presented with STEMI were included in this study with the mean age of 61.2+\-9.47. The mean age older than in the mean age of Wafa A. Rashed study (Rashed et al., 1998). The age effect seems to reflect the reluctance of physicians to administer thrombolytic therapy in older patients perhaps out of fear of hemorrhagic complication. Females were less likely to receive thrombolytic therapy than males in our study (22.5% female vs 77.5% male p=0.011). In comparison, with Wafa A. Rashed study the same result (34% female vs 66% male p=0.0001). All females in our study who receives thrombolytic therapy came too late (i.e. in the second window (3-12h)). fibrinolytic therapy was used less often in females, though information about eligibility for treatment was unavailable to determine if this difference was due to

treatment bias or differences ineligibility (Binbrek et al., 2004). The study population was too small to allow the performance of regression analysis to see whether these gender and age differences were dependent on other factors such as delay presentation) or non-diagnostic ECG. Diabetes was relatively more common in our study population, with 40% of the patients being diabetic, as compared to 18% among the European patients and this significant difference is probably related to dietary habits and poor screening programs and health care programs (Woods and Group, 1996). The alcoholic in our study considers risk factors that may be due to Iraqi people habit in drinking or some type of alcohol locally made contain toxic material. Alcohol consumption raises the levels of the fat in the blood-(the triglycerides,) which are associated with an increased risk of coronary heart disease. In a randomized clinical trial included in the meta-analysis, intake of 30 grams of alcohol elevated triglyceride levels by about 5.7 %, which translates into a 4.6% increase in coronary heart disease (Rimm et al., 1996). Alcohol consumption may also influence the inflammation associated with atherosclerotic plaques and the function of the cells that line the blood vessels (i.e., endothelial cells). Several studies show that moderate alcohol drinkers have lower levels of markers of inflammation. These markers involve a molecule called C-reactive protein that is formed during inflammatory states and which has been related to an increased risk of coronary heart disease (Goldberg et al., 1998). Reciprocally, observational studies also show that moderate alcohol drinkers have higher levels of homocysteine, a substance derived from the breakdown of the amino acid methionine that may increase the risk of blood clots (Mukamal and Rimm, 2001). Thirty-five percent of patients reach the casualty and receive thrombolytic within the first 3 hours of discharge to home without complication. In this study, all complication like basal crackle and pericarditis happen in the second group (receive thrombolytic 3-12h) the same result of the good outcome (on infarct size and ejection fraction was restricted to the treatment given within two hours of symptom onset,) this is the same to what reported in a European study (Chareonthaitawee et al., 2000). The lowest risk for dying during acute hospitalization was seen for those treated with tPA within 3 hours of acute symptoms (7.1%vs 19.2%) the same result in a study by (Goldberg et al., 1998). Lengthier presentation and treatment delays were both related with an increased mortality rate (presentation delay<1 h, 5.6% and>4 h, 8.6%; treatment delay< 1 h, 5.4%, and>90 min, 8.1%) (Newby et al., 1996).

An overcrowded ER has been demonstrated to result in delays in the initiation of reperfusion therapy. Based on local practice manner, several consultations with cardiologists and/or primary care physicians may be desired to determine the reperfusion strategy and the possible need for transfer to a hospital capable of primary percutaneous coronary interventions. These disorganized processes routinely cause delays in reperfusion. Time is saved by accelerating the decision-making processes and by having a team of providers performing. Numerous essential tasks simultaneously rather than consecutively.

5. CONCLUSION

in patients with ST-elevation myocardial infarction, one of the most important factors in predicting the outcome is the total time taken from the onset to reperfusion. delay in the prehospital period remains high in an unacceptable way. The lowest risk for dying during acute hospitalization was seen for those treated with tPA within 2 hours of acute symptoms. Elderly, female, hypertensive, and diabetic patients had longer delays at all steps. Prior infarction or bypass surgery was an added risk factor for treatment delay. In addition to delayed presentation, several in-hospital factors can delay the time to delivery of fibrinolytic therapy. These include; the delay in patient registration, a Delay in the initial evaluation of the patient, including obtaining and interpreting the electrocardiogram, and a delay in drug preparation Request for consultation.

Abbreviations	
STEMI	ST-elevation myocardial infarction
PCI	Percutaneous coronary intervention
CCU	Cardiac care unit
AMI	Acute myocardial infarction
ECG	Electrocardiography
DM	Diabetes mellitus
IHD	Ischemic heart disease

Authors contribution

Fadil Agla Bonyan designed the study, data collection and wrote the manuscript, Laith G. Shareef interpreted the result and wrote the manuscript, Assad Al-waily analyzed the data and wrote the manuscript

Ethical approval for human

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (ethical approval number 1995 at 22/9/2017)

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

Funding

This research received no external funding

Data and materials availability

All data associated with this study are present in the paper.

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