



A CLINICAL STUDY ON VARIOUS FACTORS AFFECTING THE OUTCOME OF THROMBOLYSIS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION.

General Medicine

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ABSTRACT

Background/Aims: Myocardial infarction is a major healthcare burden causing morbidity and mortality. Thrombolysis is an important reperfusion strategy in patients suffered from acute STEMI. In this study, we aim to find out the factors affecting the outcome in patients undergoing thrombolysis. **Material & methods:** It is an observational prospective clinical study. A total of 75 patients were included in the study from coronary care unit, K S Hegde hospital, Deralakatte, Mangaluru, Karnataka. The period of the study is between February, 2019 to January, 2020. **Results:** Group with successful thrombolysis had a shorter window period for thrombolysis, and had more people with comorbidities like diabetes, hypertension, and habits of smoking and alcohol when compared to the group with failed thrombolysis. **Conclusions:** The overall success rate of thrombolysis was 60%. Early thrombolysis had a better outcome in patients.

KEYWORDS

STEMI (ST-Elevation Myocardial Infarction)

INTRODUCTION:

- Acute myocardial infarction can be defined as an irreversible loss of function of the myocardium due to the necrosis of the tissue.
- The most common cause of MI is due to atherosclerosis and is associated with many non-modifiable risk factors (Age, Sex, etc) and modifiable risk factors (smoking, hypercholesterolemia, etc).
- The diagnosis of myocardial infarction can be established by elevation of myocardial enzymes (due to necrosis of the tissue), and with the help of ECG findings i.e., ST elevation.
- STEMI results in a marked elevation of the cardiac enzymes and NSTEMI causes modest elevation of the cardiac enzymes.
- Thrombolysis (fibrinolytic therapy) in STEMI has maximal benefit if it is performed within 12 hours of symptomatic onset.
- Patients without ST-Elevation are not immediate candidates for thrombolytic agents, but PCI may be considered.
- The objective of the study was to evaluate various factors affecting the outcome of thrombolysis.

PATHOGENESIS OF MYOCARDIAL INFARCTION:

Myocardial infarction typically manifests as regional wall myocardial necrosis and endocardial involvement predominantly but may also affect subendocardial and subepicardial regions.

Infarction occurs on the lines of the occluded vessel. Anterolateral infarct occurs due to left main coronary artery occlusion and right coronary artery occlusion results in inferior wall infarction.

The evolution of MI can be seen as gross findings or microscopic findings.

GROSS FINDINGS:

Earliest change (>12 hours): Pallor of the myocardium

5-7 Days: Regions can be appreciated well, with a central soft area and a depressed hyperemic border.

1-2 weeks: Infarct appears to be depressed, mainly at the margins where the organization takes place, and the borders display a white hue.

4-6 weeks: Healing may be complete for smaller infarcts

2-3 months: for larger ones.

Scarring in the healed infarcts appears white.

A ventricular aneurysm may be found out (thinning of the myocardium).

MICROSCOPIC FINDINGS:

Diagnosis can be made by the presence of necrosed tissue and a

demarcating line between the area of acute inflammation and viable myocardium.

12 and 24 hours: Hypereosinophilia (characteristic).

24 hours: Neutrophil infiltration at the border areas.

24 and 48 hours: Coagulation necrosis.

2-3 days: Lymphocytes may be seen, but are not prominent in infarct evolution.

At 3-5 days: Myocyte nuclei lost at the central portion and striations seen. In smaller infarcts, neutrophils invade the infarct and fragment, resulting in more severe karyorrhexis.

By 5-7 days: Macrophages and fibroblasts begin to appear in the border areas.

1 week: Neutrophils decline and granulation tissue appear, with neocapillary invasion and lymphocytic and plasma cell infiltration.

Second week: Fibroblasts are prominent, but they may appear as early as 1 week at the periphery.

Healing is continued, it may be complete as early as 4 weeks or may require 8 weeks or longer to complete.

Mummified myocytes are present for extended periods, even though the infarct borders are completely healed.

CLINICAL FEATURES:

The symptoms of acute myocardial infarction (MI) include chest pain, sweating, nausea, and chest tightness.

The typical chest pain of MI can be described as intense, unremitting retrosternal pain which can often radiate to the left upper arm, neck, shoulder, and jaws, lasting for 30-60 minutes. It can be experienced as a squeezing, aching, sharp, or burning type of pain.

INVESTIGATIONS:

Objectives for the approach of management include:

To determine the presence of acute myocardial infarction.

To determine the nature and extent of myocardial infarction.

To detect early and late complications of myocardial infarction.

To estimate the prognosis of the patient.

ECG: Most important for initial evaluation and triage of the patient.

Laboratory investigations include:

CBC, Lipid profile, metabolic panel, and Cardiac biomarkers.

Cardiac imaging: Echocardiography to be performed, to look for regional wall motion abnormalities and ventricular function.

Coronary angiography to be performed to determine the plan of action.

Non-invasive techniques like multidetector computer tomography coronary angiography may be performed in a low to intermediate risk of a patient suspected to have MI.

Other techniques like myocardial perfusion imaging may be performed for low-risk patients.

TREATMENT:

Initial management includes:

Supplemental oxygen: Restoration of oxygen supply and demand (prevents further ischemia).

Pain relief: Nitrates may be initiated. Refractory pain can be treated by IV Morphine.

Reperfusion strategies must be employed, either pharmacological or primary percutaneous coronary intervention at the earliest.

Fibrinolysis is performed in the setting where primary PCI could not be done in STEMI patients within the recommended timelines.

Thrombolysis:

Some of the indications for thrombolysis include:

Significant ST elevation in two or more contiguous limb leads.

The onset of chest pain less than 12 hours.

Associated with left bundle branch block.

Some of the contraindications of thrombolysis include:

Recent history of trauma.

Recent history of cerebrovascular accident.

Suspected aortic dissection.

Active internal bleeding.

THROMBOLYTIC AGENTS:

Streptokinase: The standard protocol includes administration of streptokinase 1.5 million units over one hour. It is a non-fibrin specific agent.

Other fibrin specific agents like Tenecteplase, Reteplase, and alteplase can also be used.

AIM OF THE STUDY:

- I. To analyze the overall success rate of thrombolysis.
- II. To analyze the parameters influencing the outcome of thrombolysis.

Materials and Methods:

Study Design: Observational Prospective cohort study.

Study Setting: Justice K.S. Hegde Charitable Hospital attached to K.S. Hegde Medical Academy, a unit of Nitte University, Mangalore-575018.

Study Period: The study was conducted from February, 2019 to January, 2020.

INCLUSION CRITERIA:

Presence of typical chest pain with ECG evidence of Acute myocardial infarction who were thrombolysed.

Criteria for thrombolysis

- a. ST-elevation being 2mm or more in two contiguous precordial leads or 1 mm or more in two contiguous limb leads.
- b. Time window of 12 hrs from the onset of pain to the initiation of thrombolysis.

EXCLUSION CRITERIA:

1. Late thrombolysis (more than 12 hrs from the onset of pain).
2. Recurrent myocardial infarction.
3. Presence of bundle branch block.
4. Development of pericarditis.

THROMBOLYSIS:

Patients have received streptokinase 1.5 million units in 100ml of

Normal saline over 40-60 minutes.

Success was defined by

1. Clinically – There was a subsidence of chest pain.
2. Electrocardiographically – more than 50% ST resolution in an initial lead which showed maximum ST elevation.

Applying the above-mentioned criterion, they were divided into 2 groups, after analyzing for the success of thrombolytic therapy at 90 minutes.

Group A- Successful thrombolysis

Group B- Failed thrombolysis

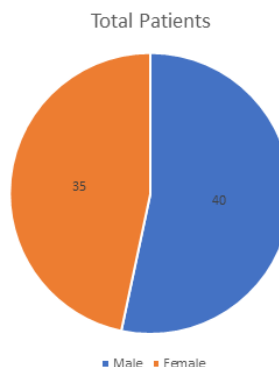
The following parameters were analyzed among them to know whether they influenced the outcome of thrombolysis.

1. Age
2. Sex
3. Smoker
4. Alcoholic
5. Type 2 Diabetes mellitus
6. Systemic Hypertension
7. Pre infarction angina
8. Location of Myocardial Infarction
9. Time of Streptokinase administration
10. Time interval between the onset of pain and the initiation of thrombolytic therapy.

RESULTS

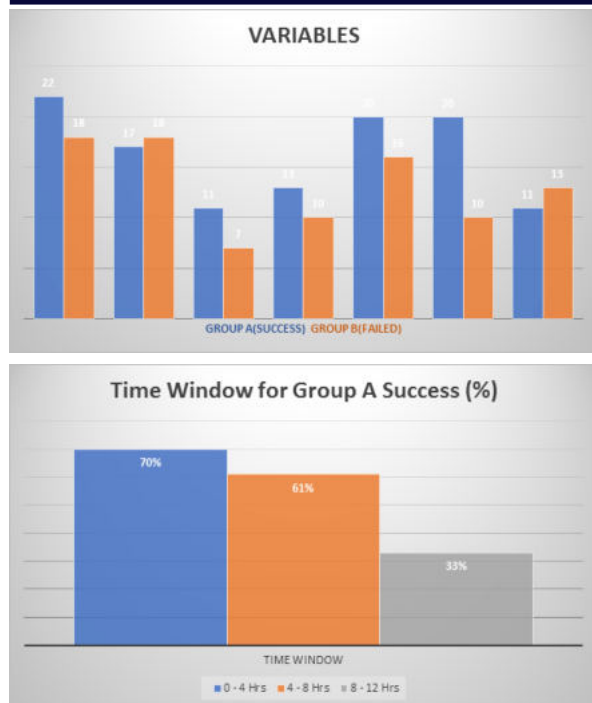
Out of 75 patients taken for the study.

- 40 patients (53%) were male and
- 35 patients (47%) were females.
- 45 patients (60%) were below 65 years of age



- 23 (30%) were diabetic
- 18 (24%) were hypertensive
- 36 (48%) were smokers
- 30 (40%) were alcoholic
- 43 (58%) patients had anterior wall MI
- 32 (42%) patients had inferior wall MI
- 11 (14%) of the patients had pre infarction angina.

CLINICAL DETAILS OF STUDY POPULATION ACCORDING TO THE OUTCOME OF THROMBOLYSIS		
Variables	Group A Success (%)	Group B Failed (%)
Number	39 (52%)	36 (48%)
Males	22 (55%)	18 (45%)
Females	17 (48%)	18 (52%)
Hypertension	11 (61%)	7 (39%)
Diabetes	13 (56%)	10 (44%)
Smoking	20 (55%)	16 (45%)
Drinking	20 (66%)	10 (34%)
Pre infarction angina	11 (47%)	13 (53%)
Time window	0 - 4 hrs	21 (70%)
	4 - 8 hrs	22 (61%)
	8 - 12 hrs	3 (33%)
Age group	< 60 yrs	30 (73%)
	> 60 yrs	14 (41%)
Anterior wall infarct	20 (46%)	23 (54%)
Inferior wall infarct	24 (75%)	8 (25%)



DISCUSSION:

The number of patients who had inferior wall myocardial infarction has higher chances of successful thrombolysis compared to anterior wall myocardial infarction.

According to Khan SB et al, anterior wall MI was associated with a higher rate of thrombolysis failure while inferior MI and lateral wall MI was associated with a higher rate of successful thrombolysis in comparison.

Alcohol consumption in the patients had a favorable outcome for thrombolysis when compared with non-drinkers.

According to Roerecke et al, lower amounts of alcohol consumption without heavy drinking episodes had a beneficial effect on the overall outcome of Ischemic heart disease. However, chronic alcohol consumption does not provide any beneficial effect on IHD.

The effect of alcohol on hemostatic factors like tissue plasminogen activator antigen is that it decreases gradually over time in chronic alcoholics and also a reduction in platelet aggregation.

Patients older than 60 years are found to have a lesser success rate in thrombolysis.

But various studies suggest elderly patients undergoing thrombolysis have a reduction in mortality rate as compared with that of younger patients.

In this study, the success rate of thrombolysis is not found to be different in comparison with the non-diabetic population.

According to a study done by Wiman B et al, they found that increased plasma levels of tissue Plasminogen Activator/PAI-1 complex reflect impaired fibrinolysis. This is more expressed in patients having type 2 diabetes leading to defective thrombolysis.

Pre infarction angina is not significant in the study group of successful thrombolysis.

A study done by Felicita Andreotti et al had demonstrated that pre infarction angina which occurs within seven days of onset of the acute event of myocardial infarction had a more chance of rapid thrombolysis events and the patency rates were higher within 35 minutes. At 90 minutes there was no significant difference in patency.

CONCLUSION:

- In this study, the overall success rate of thrombolysis was 60%.

- The group with successful thrombolysis had more smokers, alcoholics and a worse outcome was found in patients aged greater than 60 years.
- Inferior wall MI people had a better prognosis in comparison with Anterior wall MI.
- There was no difference in success rates in the case of hypertensives and diabetics.
- The success rate of thrombolysis was not affected by pre infarction angina.

SUMMARY:

The primary objective of this study is to evaluate the various factors affecting the outcome of thrombolysis in acute myocardial infarction. The patients in this prospective cohort study received streptokinase and the overall success rate of which was 60%. The outcome in patients with inferior wall MI is better in comparison with anterior wall MI. Early thrombolysis if performed in patients had a better outcome in comparison. The success rate was 60% if the patient is thrombolysed within 4 Hours of the event from the onset of symptoms. So, the time window for thrombolysis is the better predictor for thrombolysis in patients with acute myocardial infarction.

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