Section: Emergency Medicine

Original Research Article

EVALUATION OF THROMBOLYSIS IN MYOCARDIAL INFARCTION (TIMI) SCORE FOR ST ELEVATED MYOCARDIAL INFARCTION PATIENTS AT AN EMERGENCY MEDICINE UNIT

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ABSTRACT

Background: Thrombolysis in Myocardial Infarction (TIMI) risk score is used for patients with STEMI. It is simple, can be used at bedside. It can do risk classification. It is useful to assess prognosis right from admission till discharge. It can predict morbidity and mortality. In STEMI patients who receive fibrinolytic treatment it works well and has been documented. But it remains to be evaluated in local population. The objective is to evaluate TIMI score for ST elevated myocardial infarction patients at an emergency medicine unit.

Materials and Methods: Hospital based prospective study was carried out among 30 STEMI cases. All were evaluated for TIMI scoring using history, examination and necessary investigations. They were followed to study incidence of cardiogenic shock, ventricular fibrillation, pulmonary edema and death.

Results: Majority (60%) were >64 years. Males were more (73.4%). Hypertension was most common comorbidity (46.6%). Angina was present in all cases followed by time to thrombolyse >4hrs (63.3%). Low, moderate and high-risk score as per TIMI was seen in 56.6%, 23.3% and 20% respectively. In low-risk no one had cardiogenic-shock, ventricular-fibrillation, pulmonary-edema or death. Incidence of cardiogenic-shock was 28.5% in moderate-risk and 66.7% in high-risk and this was significant. Incidence of ventricular-fibrillation was 14.2% in moderate-risk and 16.6% in high-risk but not significant. Incidence of pulmonary-edema was 28.5% in moderate-risk and 66.7% in high-risk and was significant. Incidence of death was 14.2% in moderate-risk and 33.3% in high-risk but not significant.

Conclusion: Patients with high TIMI scores were more likely to have post thrombolytic complications compared with those with low scores. Thrombolysis in patients with low TIMI risk scores showed better outcome compared to patients high TIMI scores.

Keywords: Myocardial infarction, medicine, evaluation.

INTRODUCTION

The most common cause of death is the cardiovascular diseases (CVD) all over the world. Of the total mortality, one third of them are due to CVD.[1] The most common symptom that prompts the patients to land in the emergency is the chest pain. Acute coronary syndrome (ACS) is the most common cause of chest pain. There can be other causes also which can cause the chest pain. But they stand at the lower side in the list of causes of chest pain. ACS means unstable angina as well as acute myocardial infarction (AMI). The plaque due to atherosclerosis breaks down in AMI. At the same time, the thrombosis can occur in an artery which had undergone infarction earlier.[2,3] Due to continuous research, physicians have a variety of choices for the treatment of ST elevated myocardial infarction

(STEMI). These modalities help restore the blood supply. They can also prevent the further events of AMI.[4]

Studies have shown that time to reperfusion with thrombolysis is a critical determinant of outcome. Thrombolytic therapy has its greatest effect on reperfusion when administered to patients within 2-3 hours after symptom onset, the so-called golden hour. Prehospital administration of thrombolytic therapy to STEMI patients has been effective and safe and is associated with substantial gain in time to treatment and efficacy. It seems that the ability of thrombolytic agents to reperfuse the occluded artery diminishes with time.[5]

For effective management of ACS, classification of patient condition based on the risk is necessary.[5] The initial treatment is very well defined for patients with STEMI. In spite of this advantage, the risk classification is necessary for these patients also. This will affect the near term and long-term decision like what level of hospital care is required, what kind of therapeutic intervention is needed and what are the different resources that may be useful for good prognosis. STEMI patients may be given therapy so that fibrin lysis takes place, but the risk of death remains. What proportion of patients are going to die in the near future varies in such cases. These variations can therefore confuse the treating physicians regarding the choice of therapy. They require pre-determined treatment algorithms so that they can get some idea about the prognosis. This can help them manage their cases. Therefore, the classification of risk is very important to achieve these objectives. The risk classification should be practical, simple, easy to apply. It should be able to apply at the bedside. It should use the easily available clinical data that is routine. It should be accurate. It should provide the prognosis that is independent. It should include important risk factors.[6]

A risk model satisfying these objectives could also be useful in adjusting for baseline risk in epidemiological studies, such as those examining variation in practice patterns, provider types, or specific therapies. Though many studies have attempted to define the prognosis of patients with MI and/or provide risk algorithms, they were performed before the widespread use of thrombolytic agents.[7]

One such tool is the Thrombolysis in Myocardial Infarction (TIMI) risk score. It is used for patients with STEMI. It is simple. It uses eight risk factors. It can be used at bedside. It can do the risk classification of patients with STEMI. The score ranges from 0-14. Morrow et al developed it. It is very robust tool. It is useful to assess the prognosis right from admission till discharge. It can predict the deaths. In STEMI patients who receive the fibrinolytic treatment the TIMI risk score works well and it has been documented. But it remains to be evaluated in the local population. The risk factors knowledge mostly comes from the developed countries. The TIMI score is based on these risk factors from this population. CVD is common in the developing countries also. More research is required to evaluate the TIMI score in developing countries.[1] Hence, present study was carried out to evaluate the thrombolysis in myocardial infarction (TIMI) score for ST elevated myocardial infarction patients at an emergency medicine unit.

MATERIALS AND METHODS

Present study was a hospital based prospective study. It was carried out at Kamineni Institute of Medical Sciences, Narketpally among 30 patients from September 2014 to October 2016

The study was carried out among 30 cases. They belonged to either gender. All ages were considered for inclusion. They were coming to the emergency medicine department. All of them were selected for thrombolytic therapy.

Institution Ethics Committee permission was obtained. Written informed consent was taken from all cases. AMI was diagnosed if the case had following observations present: 8

Inclusion criteria

- All patients with STEMI diagnosed in Emergency Medicine and Trauma care.
- Chest pain for more than 30 minutes
- Symptom onset less than 6 hours
- Fibrinolytic eligible

Exclusion criteria

- Patients with recent surgical history.
- Patients with major bleeding disorders.
- Patients with polytrauma.
- Patients with hypersensitivity reactions.
- Patients with history of recent hemorrhagic stroke.

Methodology: complains of pain in the chest or any other symptoms that mimic or suggest the possible AMI, if there was an elevation of the ST segment: this was >0.2mV in V1, V2 & V3; new left bundle branch block typical curve of creatine kinase enzyme and its MB fraction.

The case details were entered in the study questionnaire which was pre-designed, pre-tested, semi-structured study questionnaire. Individual points were added to calculate the final TIMI score. If the score was 0-4 then it was considered as low risk. If the score was 5-8, it was considered as moderate risk and if the score was 9-14, it was considered as high risk.

All cases were treated as per the standard guidelines and standard procedures of the hospital. Streptokinase was given in the dose of 1.5 million units over one hour for thrombolysis. The follow-up period was 24 hours. During this period, all cases were kept under observation for all parameters, however from study point of view special focus was given for noting down the incidence of shock, pulmonary edema, cardiogenic shock, death.

Cardiogenic shock was defined as a state of persistent hypotension (systolic blood pressure < 90 mmHg) accompanied by one or more signs of hypoperfusion

including altered sensorium, cold extremities, oliguria (urine output < 30 mL/hr). VARIABLES: KILLIP class – The Killip classification, which categorizes patients based on the severity of Heart failure.[9]

Killip class I - No clinical signs of heart failure.

Killip class II - Rales in lungs, third heart sound (S3), and elevated jugular venous pressure (JVP).

Killip class III - Acute pulmonary edema.

Killip class IV – with arterial hypotension or cardiogenic shock.

Statistical analysis

The data was entered in the Microsoft excel worksheet. Proportions were used to describe the data. For commenting on association using proportions, chi square test was used if the data satisfied the chi square norms or the Fischer exact test was used. P value of less than 0.05 was taken as statistically significant.

RESULTS

Table 1: Age wise distribution of cases (n=30)

Age (years)	Frequency	Percentage
< 64	18	60
65-74	6	20
> 74	6	20

Majority i.e. 60% were below the age of 64 years. 20% each were belonged to the age group of 65-74 years and more than 74 years respectively.

Table 2: Sex wise distribution (n=30)

Sex	Frequency	Percentage
Male	22	73.4
Female	8	26.6

Males were more (73.4%) compared to only 26.6% of females in the present study.

Table 3: Comorbidities of the patients (n=30)

Comorbidities	Frequency	Percentage
Diabetes	11	36.6
Hypertension	14	46.6
No comorbidity	05	17.8

Hypertension was the most common comorbidity in 46.6% of the cases followed by diabetes in 36.6% of the cases. Five cases had neither diabetes nor hypertension.

Table 4: Distribution of TIMI risk score variables in current study population (n=30)

Variables	Frequency	Percentage
Angina	30	100
Time to thrombolyse > 4hrs	19	63.3
Anterior lead ST elevation	17	56.6
Weight < 67 kg	13	43.7
Heart rate > 100/min	10	33.7
Killip class II-IV	7	23.3
Systolic blood pressure < 100 mmHg	7	23.3

Angina was present in all cases followed by time to thrombolyse >4hrs in 63.3% of the cases. Anterior lead ST elevation was seen in 56.6% of the cases followed by weight <67 kg in 43.7% of the cases. Heart rate >100/min was seen in 33.7% of the cases. KILLIP class II-IV was seen in 23.3% of the cases. SBP < 100 mmHg was also seen in 23.3% of the cases.

Table 5: TIMI risk groups (n=30)

Risk groups	TIMI score	Frequency	Percentage
Low	0-4	17	56.6
Moderate	5-8	7	23.3
High	9-14	6	20

Majority i.e. 56.6% were in the low-risk category as per TIMI scoring followed by 23.3% in the moderate risk category and six cases i.e. 20% were in the high-risk category.

Table 6: Association between TIMI risk scores and morbidity and mortality in STEMI patients (n=30)

Morbidity and mortality	Low risk	Moderate risk	High risk	P value
Cardiogenic shock	0	2 (28.5%)	4 (66.7%)	0.002
Ventricular fibrillation	0	1 (14.2%)	1 (16.6%)	0.243
Pulmonary edema	0	2 (28.5%)	4 (66.7%)	0.0002
Death	0	1 (14.2%)	2 (33.3%)	0.059

In those with low-risk category, no one had cardiogenic shock, ventricular fibrillation, pulmonary edema or death. The incidence of cardiogenic shock was 28.5% in those with moderate risk and increased to 66.7% in those with high risk and this trend was found to be statistically significant. The incidence of ventricular fibrillation was 14.2% in those with moderate risk which increased to 16.6% in those with high risk but this trend was not significant. The incidence of pulmonary edema was 28.5% in those with moderate risk category which increased to 66.7% in those with high risk and it was significant. The incidence of death was 14.2% in those with moderate risk category compared to 33.3% in those with high-risk category but the difference was not found to be statistically significant.

DISCUSSION

TIMI risk score can be used as an effective bedside tool for early risk stratification, based on clinical information available at time of hospital arrival.[10] Morrow et al found the predictive capacity of this risk score stable over multiple time points, in men and women, and in smokers and non-smokers in the TIME II trial population in whom it was developed. 6 We applied the TIMI risk score for STEMI in a group of 30 patients and classified them into low risk, medium and high-risk group based on TIMI score. In current study of 30 patients, the maximum numbers of patients were found to be in the age group of less than 64 years (60%). The youngest being 41 years old and oldest being 80 years of age. The mean age was 59.66+12 years.

In a study of 494 patients done by Muhammad Shakir Lakhani et al, the mean age of study population is 58.5+ 10.64 years.[11]

In a study of 494 patients done by Anna Kozieradzka et al, the mean age of study population is 58.5+ 11.3 years.[12] In a study of 983 patients done by Silveria et al, the mean age of study population is 59.9+ 12.6 years with 602 (64.2 %) were under 65 years old.[13] In a study of 572 patients done by Gonzalech-Pacheco H et al, the mean age of study population is 57.9 + 11.6 years.[14]

In current study, the percentage of males and females are 22(73.4%) and 8(22.6%) respectively, which was similar with study done by Chamuleau, de Winter, Levi, et al.[15]

In a study done by Arslan et al,[16] males were 120(75%), females 40(25%) compared to males 11343 (75.3%) and females 3717 (24.7%) in Morrow et al study. 6 In a study done by Gonzalech-Pacheco et al, the percentage of males in study population are 484 (84.6%) and females are 88 (15.4%).[14] In Silveria et al study, the percentage of males and females are 22(73.4%) and 8(22.6%) respectively. It is observed that male predominance was seen in all above studies.[13]

In Gonzalech-Pacheco et al study, 30.1% had history of Diabetes and 50.3% were hypertensive.[14]

In Silveria et al study, 24.2% presented with Diabetes mellitus and 65.8% had hypertension. In Arslan et al study, 58 (36.3%) had Diabetes mellitus and 86 (53.8%) were hypertensive.[13] In Anna Kozieradzka et al study, 15.5% were Diabetic and 41.7% were hypertensive.[12] In Morrow et al study, 2095 (13.9 %) had Diabetes and 4583 (30.4 %) were hypertensive.[6] In current study, 11 (36.6 %) had Diabetes and 14 (46.6 %) were hypertensive. It is observed that in all above studies majority of the patients with STEMI was hypertensive. In another study done by Parizad et al, 30% presented with Diabetes and 21% with hypertension which was not similar to other studies.[17]

In Anna Kozieradzka et al study 44.1 % of patients are presented with anterior wall MI.[12] In Arslan et al study 63.8% of STEMI patients are presented with anterior wall MI. 16 In Morrow et al study, 6428 (42.7%) of patients are presented with anterior wall MI.[6]

In present study,[17] (56.6 %) of patients are presented with anterior wall MI. It is observed that majority of STEMI patients were presented with anterior wall MI.

Anna Kozieradzka et al reported patients with TIMI score 0-5 as low-risk group n=386(78.1%), TIMI score 6-7 as medium risk group n=81(16.3%) and TIMI score >8 as high-risk group n=27(5.4%).[12] Arslan et al reported patients with TIMI score 0-4 as low-risk group n=90(56.3%), TIMI score 5-8 as medium risk group n=50(31.8%) and TIMI score 9-14 as high-risk group n=20(12.5%).[16] Gonzalech-Pacheco H et al reported patients with TIMI score 0-4 as low-risk group n=389(68%) and TIMI score >5 as high-risk group n=183(32%).[14] In present study, patients TIMI score 0-4 are reported as low-risk group n=17 (56.7%), TIMI score 5-8 as medium risk group n=7(23.3%) and TIMI score 9-14 as high-risk group n=5(20%). It is observed that majority of the patients with STEMI are from low-risk group.

Arslan et al reported cardiogenic shock in n=6 (6.7%) patients from low-risk group, n=8(16%) patients from medium risk group and n=12(20%) patients from high-risk group.[16] Gonzalech-Pacheco H et al reported cardiogenic shock in n=6(1.5%) patients from low-risk group and n=20(10.9%) patients from high-risk group.[14] In present study patients with cardiogenic shock were noted in none of the patients from low-risk group, n=2 (33.3%) patients from medium risk groups and n=4(66.7%) patients from high-risk groups. It is observed that majority of the patients with cardiogenic shock are from high-risk group. (p=0.002).

Arslan et al reported post MI arrhythmias in 2 (2.2%) patients from low-risk group, 8 (16%) patients from medium risk group and 10(50%) patients from high-risk group.[16] Gonzalech-Pacheco H et al reported ventricular arrhythmias in n=23(5.9%) patients from low-risk group and n=27(14.8%) patients from high-risk group.[14] In present study patients with ventricular fibrillation were noted in none of the patients from low-risk group, n=1(50%) patients

from medium risk groups and n=1(50%) patients from high-risk groups. (p=0.243).

Arslan et al reported pulmonary edema in 6 (6.7%) patients from low-risk group, 10(20%) patients from medium risk group and 16(80%) patients from high-risk group.[16] In present study patients with pulmonary edema were noted in none of the patients from low-risk group, 2(40%) patients from medium risk groups and 4(60%) from high-risk groups. (p=0.012).

Anna Kozieradzka et al,[12] study reported 8(2.07%) mortality from low-risk group, 11(13.58%) from medium risk group and 12(44.4%) from high-risk group in 30 days. Arslan et al reported mortality in 4(4.4%) patients from low-risk group, 8, (16%) patients from medium risk group 12 (60%) patients from high-risk group in 30 days.[16] Gonzalech-Pacheco H et al,[14] reported 8(2.1%) mortality from low-risk group and 27(14.8%) from high-risk group in 30 days. In current study deaths occurred were noted in none of the patients from low-risk group, 1(33.3%) patient from medium risk groups and 2(66.7%) patient from high-risk groups within 24 hours of admission. (p=0.059)

CONCLUSION

Current study demonstrates that patients with high TIMI scores were more likely to have post thrombolytic complications compared with those who have low scores. Thrombolysis in patients with low TIMI risk scores showed better outcome compared to patients high TIMI scores.

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