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ORIGINAL ARTICLE

Risk Stratification of Patients Undergoing Primary Pci for Stemi Using Dynamic Timi Risk Score at A Tertiary Care Cardiac Center

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ABSTRACT

Objective: To determine the frequency of severity based on dynamic TIMI scoring among STEMI patients undergoing primary PCI at a tertiary care Cardiac center.

Subject and Methods: This case series study was carried out on 171 patients admitted with acute STEMI undergoing PPCI at the department of cardiology NICVD, Karachi for six months from February 1st to July 30th, 2018. After the selection of patients, they were shifted to the Cath lab, the arterial sheath was passed through the femoral route only although the radial route is also present but to reduce the bias we choose the same femoral route only. Angiography was done and the area of occlusion identified was ballooned/stented by the interventional cardiologist having experience of at least 03 years. The study parameters of dynamic TIMI risk score points were recorded on a predesigned proforma.

Results: The mean age of the patients of the study subjects was 59.89±12.67, Distribution of gender was stated, 133(77.78%) patients were male and (22.22%) were female. Outcome dynamic TIMI risk score severity was stated, 86(50.29%) patients had a low risk, 62(36.26%) patients had a moderate risk, 23(13.45%) patients had a high risk.

Conclusion: When used in STEMI patients, this new approach shows the ever-changing risks and could be helpful in clinical decision-making as well as risk assessment.

Keywords: ST-segment elevation myocardial infarction; Primary percutaneous coronary intervention, TIMI

INTRODUCTION

When myocardial ischemia is present along with persistent ST elevation on the electrocardiogram (ECG) and the subsequent release of biomarkers indicative of myocardial necrosis, a clinical syndrome known as STEMI is present. Task Force for the Universal Definition of Myocardial Infarction established by the European Society of Cardiology, the American Heart Association, and the World Heart Federation defines diagnostic ST elevation in the absence of left ventricular hypertrophy or left bundle-branch block as new ST elevation at the J point in two or more adjacent leads, each measuring at least two millivolts (0.22 mV) in men or 1.5 millivolts (0.15 mV) in women in leads V2–V3, respectively.[1]

There are many different manifestations of coronary heart disease and myocardial infarctions are among them. Nearly 1.2 million Americans suffered a heart attack in 2006. An MI with ST-segment elevation occurred in 25% to 30% of patients.[2]

When a patient has a recent ST-segment elevation myocardial infarction, the optimal therapy is primary percutaneous coronary intervention (PPCI). Patients with an acute ST-segment elevation myocardial infarction select PCI as their preferred method of reperfusion (STEMI), but it is only effective if it is performed quickly.[3]

A major logistical problem arises in many areas because few patients go to a PCI-capable hospital.[4] Because of this, the percentage of patients who wait 90 minutes or less from the time they walk in the door to the time they leave the hospital has become an important quality metric. The time it takes an institution from its front door to its balloon has financial ramifications. STEMI risk stratification is crucial. These assessments have progressed to include predicting future cardiac events based on clinical features found during an initial evaluation in a hospital emergency room. Both patients and clinicians can benefit from knowing the possible prognosis and how aggressive treatment should be administered.[5] Providing the best treatment strategies recommended in international guidelines can be difficult in developing countries with wide variations in healthcare service provision. Patients with STEMI have several treatment options that have a long history of success.[6,7] ST-elevation myocardial infarction patients now have a new treatment option in the form of primary percutaneous coronary intervention (PPCI) (STEMI).[8]

Worldwide, cardiovascular disease was estimated to be responsible for nearly 30% of all deaths in the Global Burden of Disease Study from 2013.[9] The dynamic TIMI risk score is based on two levels of assessments and is used to estimate the long-term risk of morbidity and mortality following STEMI.[10]

Dynamic TIMI risk score assessments according to which 39 (48.75%) were included in the low-risk group, 25 (31.25%) in the moderate risk group, and 16 (20%) in high-risk groups.[10] There is growing worried about cardiovascular disease (CVD) in poor and middle-income nations as risk factors including smoking and obesity become increasingly widespread across the world and also these are the leading cause of death for both men and

women all over the world.[10] However, risk knowledge is primarily derived from developed countries thus knowledge of the importance of the adverse events in the local population groups should be considered because of the different body habitués, environment, and dietary habits. Risk assessment is therefore important for prognostication, counseling of patients and attendants, and short and long-term management of patients. Because patients with STEMI have such a wide range of risk profiles, accurate risk stratification is essential in the treatment of the acute coronary syndrome. STEMI risk stratification can be done in several ways, although healthcare providers most often employ the TIMI score system. Recently a new system was introduced, the dynamic TIMI scoring system, but how much it is validated for a large population both local and international is not curtained as limited data in this regard. Thus to conduct this research and compare these two important risk stratification tools in the local population in a large leading public sector hospital is of very much importance.

MATERIAL AND METHODS

This case series study was carried out on 171 patients admitted with acute STEMI undergoing PPCI at the department of cardiology NICVD, Karachi for six months from February 1st to July 30th, 2018. The patients either gender male and female, age >36<80 years undergoing primary PCI with STEMI as per operational definitions and presenting within 12 hours of symptom onset were included in this study. While patient who did not give consent, history of cerebrovascular disease, assessed by history (sudden loss of movement of body parts or slurred speech), clinical examination (loss of sensation on touch) confirmed on CT scan brain showing hypodense (infarct) or hyperdense (bleed)area as per record of the patient were excluded from the study. Increased risk of severe bleeding (bleeding diathesis like hemophilia, deranged PT & APTT) was confirmed through the record of the patient. After approval of the study from the College of Physicians and Surgeons of Pakistan, written informed consent was taken from all the patients admitted with acute STEMI undergoing PPCI at N.I.C.V.D. for using their data in research. Demographic detail (including name, age, and gender) was obtained. The study included everyone who met the eligibility requirements. As soon as the right patients had been found, they were transferred to the catheterization lab, where the arterial sheath was only passed through the femoral route (even though there is also a radial route), to reduce bias. The interventional cardiologist with at least three years of experience performed angiography and ballooned/stented the area of occlusion that was found. A presentation and discharge, the study parameters for dynamic TIMI risk score points were documented on a predesigned proforma for each case. According to their dynamic TIMI risk score points, the patients were divided into three risk groups: low-risk, "moderate-risk," and "high-risk."

Data Analysis: Data was entered and analyzed through SPSS 21. Quantitative variables like age, height, weight, BMI, and dynamic TIMI score were analyzed using the mean and standard deviation while qualitative variables like frequency and percentage were analyzed using these two methods: frequency and percentage gender, smoking status, DM, HTN, angina, SBP<100, heart rate>100, Killip class, weight<67, Anterior STE, LBBB, time to rx>4hours, recurrent MI, stroke, major bleeding, CHF, shock, arrhythmia, renal failure Socioeconomic status, dynamic TIMI score (Low/moderate/ high). Effect modifiers such as gender, smoking status, BMI, and socioeconomic status were stratified to see how they influenced the results, and a post-stratification chi-square test was used with a P-value threshold of 0.05 to determine whether or not the differences were meaningful.

RESULTS

A total of 171 patients fulfilling selection criteria were included in the study. In table 1 descriptive statistics of quantitative variables age, BMI, and Dynamic TIMI score were calculated in terms of mean and standard deviation, Mean and SD of the age of the patients of the study subjects was 59.89±12.67, BMI of the patients was 26.76±7.43 and dynamic TIMI score 11.9±4.76. In table 2 Distribution of gender was stated, 133(77.78%) patients were male and 38(22.22%) were female. The distribution of smoking was stated, 93(54.39%) patients were a smoker and 78(45.61%) patients were non-smoker patients. The distribution of DM was stated, 76(42.9%) patients were diabetic and 95(57.1%) patients were nondiabetic. The distribution of hypertension was stated, 111(64.91%) were hypertensive and 60(35.09%) were non-hypertensive patients. Distribution of angina was stated, 6(3.51%) patients had angina and 165(96.49%) had not. Distribution of SBP<100 was stated, 145(84.79%) patients were having SBP<100 and 26(15.20%) patients had SBP>100. Distribution of heart rate >100 was stated, 155(90.64%) patients had heart rate >100 and 16(9.36%) patients had heart rate <100. Distribution of Killip class was stated, 73(42.69%) patients had Killip class II, 7(4.09%) patients had Killip class III, 34(19.88%). patients had Killip class IV.

Distribution of weight was stated, 112(65.49%) have more than 67 kg weight and 59(34.51%) have less than 67 kg weight.

The distribution of LBBB was stated, 65(38.01%) patients were found LBBB, and 106(61.99%) patients were not found LBBB.

Distribution of Time to rx>4 hr. was stated, 82(47.95%) were showed Time to rx>4 hr. and remaining were showed Time to rx<4 hr.

The distribution of recurrent MI was stated, 61(55.45%) patients had recurrent MI and 110(44.45%) had not. Recurrent MI.

The distribution of CHF/shock was stated, 2 (0.12%) patients had CHF/shock and 169(98.83%) patients had CHF/shock.

The distribution of Arrhythmia was stated, 73(42.69%) patients had Arrhythmia and 98(57.31%) patients had Arrhythmia.

The distribution of Major bleeding was stated, in 39(22.81%) patients major bleeding was found., 132(477.81%) patients not suffered from any major bleeding. The distribution of stroke and renal failure was stated, but conditions were not found in the study population. Distribution of socio-economic status was stated, 76(44.44%) patients belong from the lower class,

54(31.58%) patients belong from the middle class, 741(23.97%) patients belong from the upper class. In table 3 Distribution of outcome, dynamic TIMI risk score severity was stated, 86(50.29%) patients had a low risk, 62(36.26%) patients had a moderate risk, 23(13.45%) patients had a high risk. The chi-square test was used in table 4 to stratify the severity of the dynamic TIMI risk score about effect modifiers. This means that a P-value of less than 0.05 is considered significant.

Table 1: Distribution of patients according to descriptive statistics of age, BMI, and Dynamic TIMI score (n=171)

Variables	Mean	Std. Deviation
Age	59.98	12.76
BMI	26.76	7.43
Dynamic TIMI score	11.9	4.76

Table 2: Distribution of patients according to different qualitative variables (n=171)

Variables	Frequency	Percentage
Gender:		
Male	133	77.78
Female	38	22.22
Smoking	93	54.39
DM	76	42.9
HTN	111	64.91
Angina	6	3.51
SBP<100	145	84.79
Heart rate>100	155	90.64
Killip class:		
II	73	42.69
III	7	4.09
IV	34	19.88
Weight>67	112	65.49
LBBB	65	38.01
Time to rx>4 hr.	82	47.95
Recurrent MI	61	55.45
CHF/shock	2	0.12
Arrhythmia	73	42.69
Major bleeding	39	22.81
Stroke	0	0
Renal Failure	0	0
Socio economic status:		
Lower	76	44.44
Middle	54	31.58
Upper	41	23.97

Table 3: Distribution of patients according to Dynamic TIMI Score (n=171)

Dynamic TIMI risk stratification	Frequency	Percentage
Low	86	50.29
Moderate	62	36.26
High	23	13.45

Table 4: Stratification of the severity of dynamic risk score concerning effect modifiers (n=171)

Variables	Dynamic TIMI risk score			P-value
	Low	Moderate	High	
Gender:				
Male	68	44	21	0.124
Female	18	18	2	
Smoking	30	44	19	0.001
BMI>67	52	40	20	0.05
Socio economic status:				
Lower	22	12	5	0.097
Middle	25	32	9	
Upper	39	18	9	

DISCUSSION

TIMI dynamic risk score for STEMI includes a recognized instrument, the TIMI risk score, to allow for ongoing risk assessment. It is prospectively validated. Prior complications and a patient's changing condition influence risk stratification, which is an ever-evolving process.[11] Consequently, an extensive scoring system should offer an initial evaluation of illness severity and then add in-hospital events before delivering an estimate of long-term mortality. By using the TIMI risk score in its original form, clinicians can determine the severity of a patient's disease when they first arrive in the hospital by predicting how long the patient will stay in the hospital and how long they will live.[12] An estimate of 1-year mortality on discharge can be produced from an analysis of the six dynamic score elements occurring during index hospitalization and the admission score. Discharging doctors, outpatient clinicians, and patients can use this information to help direct their follow-up care after discharge. Integer values are used in the dynamic TIMI risk score for STEMI, and the final score can be calculated by adding the integer values. The original TRS does not use weighted terms. The risk-benefit ratio of treatment devices and medications is influenced by patient mortality and morbidity estimates.[24] It's difficult to judge a new treatment's effectiveness without knowing the patient's risk level when they leave the hospital. There may also be increased absolute and relative benefits from treatments such as prasugrel or ticagrelor when mortality is higher than usual.[24]

For example, the dynamic TRS may help guide tailored cardiopulmonary rehabilitation and follow-up visits as well as the use of powerful but expensive therapeutics for specific populations.[25,26]

We can begin evaluating post-STEMI treatments for low-risk patients by identifying them. These types of studies are especially important now because of the tight economic conditions we find ourselves in. This study has limitations because it tries to strike a balance between the need for simplicity and the desire for accuracy. The new in-hospital variables were put to the test to see if they adhered to the proportionality assumption. We believe the proportional hazard test is unreliable. Small proportionality assumption violations don't derail the Cox proportional hazards model, which has gained widespread acceptance for this reason.[27] Renal failure's overall hazard ratio can be thought of as an average effect over time. It's also worth noting that the dynamic risk score was derived and validated in studies conducted in the third phase. It was found that the score could be translated to a completely PCI-treated population in TRITON-TIMI 38 from Extract-TIMI 25, which had a majority of fibrinolysis-treated patients. Because the score is based on data from patients who were eligible to enroll, it must still be evaluated before it can be used in different healthcare settings.[28,29] It's possible that this doesn't apply to all populations, however in the TRITON-TIMI external population, the score's capacity to risk-stratify is very reliable. Due to the score's limited validation, it may be unable to accurately predict risk in other situations or populations, such as those with unstable angina or NSTEMI. A conscious choice was made to exclude novel markers and laboratory studies in favor of in-hospital

clinical events so that the score could be widely applied without requiring any additional testing. Because of this, factors like troponin elevation and lack of ST-elevation resolution were excluded, but research shows that these factors confer risk and may have a significant impact on mortality on their own.[30,31] Dynamic time risk scoring for STEMI Risk score Mortality for 1 year (%). According to the dynamic TIMI risk score, the patients are distributed into three groups 39 (48.75%) in LOISK, 25(31.25%) in MODERATE RISK, 16 (20%) HIGH RISK.

There was a difference observed in the stratification of patients when TIMI AND DYNAMIC TIMI was assessed. Among the low-risk group, according to the TIMI risk score, 3 were found to be at moderate risk and 8 were at high risk when assessed using DTIMI scoring. It's important to keep track of patients who have the Dynamic TIMI risk score applied to them because the condition of these patients can change over time.

In our study where the patients were stratified using both TIMI and Dynamic TIMI, of which some were found to be at a higher risk group when assessed by Dynamic TIMI but in TIMI scoring they were in a lesser risk group.

Our study suggests that High-risk group patients needed interventions, inpatient care such as more frequent monitoring of vitals.

CONCLUSION

An updated estimate of mortality at the time of discharge from the hospital is provided by the dynamic STEMI TIMI risk score, which is a prospectively derived and validated method. Instead of just looking at the overall risk, this score also takes into account events that occurred during the index hospital stay and are associated with increased mortality risk from STEMI after discharge. For patients with STEMI undergoing primary PCI, this new approach illustrates how risks change with time, and it could be helpful in better understanding risk and making clinical decisions.

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