

CORRELATION OF GLOBAL REGISTRY OF ACUTE CORONARY EVENTS (GRACE) WITH THE ANGIOGRAPHIC SEVERITY AND EXTENT OF CORONARY ARTERY DISEASE IN PATIENTS WITH NON- ST ELEVATION ACUTE CORONARY SYNDROME

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ABSTRACT

Objective: To determine whether the GRACE risk score correlates with the angiographic extent and severity of coronary artery disease in patients with NSTEMI-ACS undergoing cardiac catheterization.

Methodology: We conducted a cross sectional descriptive study in 154 patients with NSTEMI-ACS admitted at AFIC-NIHD from 1st April to 30th September 2011. For each patient the GRACE risk score was calculated by using specific variables collected at admission. The extent and severity of coronary artery disease was evaluated on angiography for each patient.

Results: A total of 154 patients were included in the study. The average age of the patients was 55.81 years. Majority (75%) of the patients was male and 25% were females. The mean GRACE score was 132.85. Overall 40 patients had low, 54 had intermediate, and 60 had high GRACE risk score. Among patients with low score 28 had SVCAD, 4 patients had DVCAD and none of the patients had TVCAD. In the intermediate group 24 patients had SVCAD, 18 had DVCAD and 6 had TVCAD whereas among the high GRACE risk score 4 patients had SVCAD, 24 had DVCAD and 32 had TVCAD. Regarding the severity of coronary artery disease; among the low GRACE risk score patients; 8 had subcritical and 32 had critical CAD. In the intermediate GRACE risk score subset of patients, 6 had subcritical and 48 had critical CAD and none of the patients of high GRACE risk score had subcritical CAD and all 60 patients had critical CAD.

Conclusion: GRACE risk score is a valuable noninvasive tool in predicting the extent and severity of CAD.

Keywords: CAD, GRACE score, NSTEMI.

INTRODUCTION

Despite therapeutic advances, cardiovascular disease remains the leading cause of death worldwide^{1,2}. The World Health Organization expects heart disease to be the number one cause of death in developing countries by 2010^{1,2}. Knowing the poor survival rate in the high-risk patients, giving the right treatment becomes imperative. Estimated risk, based on clinical characteristics, is challenging and imprecise, yet risk assessment is needed to guide triage and key management decisions. Therefore, early risk stratification plays an important role in the optimal management of non-ST elevation (NSTEMI) acute coronary syndrome (ACS)³.

Over the past decade, a multitude of risk scores have been proposed to facilitate risk assessment of further adverse events including death and MI⁴. The examples are platelet glycoprotein IIb/IIIa in unstable angina: Receptor Suppression Using Integrilin Therapy (PURSUIT RS), Thrombolysis in Myocardial Infarction (TIMI RS) and the Global Registry of Acute Cardiac Events risk score (GRACE RS). Risk stratification directs decisions regarding the aggressiveness of invasive workup and medical therapy, balancing a patient's risk of ischemic events such as death or MI with the risk of bleeding and procedural complications.

The GRACE risk score developed from a large multinational prospective patient registry has been extensively validated⁵ and shown to be a strong predictor of in hospital mortality across the spectrum of the population with ACS.

The components of the GRACE risk score are age, heart rate, systolic blood pressure, Killip

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class, cardiac arrest, serum creatinine, ST-segment deviation and cardiac biomarker status. Although GRACE risk score for stratification of ACS patients has been validated in several studies⁶ but its association with angiographic severity is limited.

The GRACE risk score can be useful to assist in decision-making with regard to treatment options in patients with ACS. The objective of our study is to determine whether the GRACE risk score correlates with the angiographic extent and severity of coronary artery disease in patients with NSTEMI-ACS undergoing cardiac catheterization.

METHODOLOGY

It was a cross sectional observational study. Study was conducted at AFIC/NIHD Rawalpindi between 1st April to 30th September 2011. A total of 154 patients with diagnosis of Non ST elevation acute coronary syndrome undergoing coronary angiography were included in the study. Written informed consent was obtained in all cases for recruitment in the study and the procedures involved. Their demographic details, investigations and angiographic findings were recorded. SPSS version 13.0 was used to record and analyze the data. GRACE risk score for each patient was calculated by using the online GRACE Risk score calculator. The extent of CAD on angiogram was defined as involvement of single, double or three vessel CAD whereas severity was defined as: significant when > 70% of stenosis in any of the major epicardial coronary arteries or left main stem > 50% stenosis.

On the basis of in hospital mortality the range of GRACE risk scores in low, intermediate and high risk is as under:

Low: GRACE Risk Score (<108), Intermediate: GRACE Risk Score (109-140), High: GRACE Risk Score (>140)

RESULTS

A total of 154 patients were included in the study. The average age of the patients was 55.81 ± 9.3 years. Majority (75%) of the patients was

male and 25 % were females. A number of patients (68%) (n=102) were hypertensives, 32% (n=48) patients had diabetes mellitus, 37.3% of patients (n=56) were smokers and 9.3% (n=14) were obese. The mean GRACE score was 132.85.

Distribution of GRACE risk is shown in table-1. The association of GRACE Score with extent and severity of coronary artery disease are described in table-2 and 3.

DISCUSSION

The severity of coronary artery disease has been correlated with different risk stratification schemes like PURSUIT, AHCPR, and TIMI⁷.

Table-1: Distribution of GRACE risk score.

GRACE risk	n
Low	40
Intermediate	54
High	60

However using such variables like serum creatinine, heart rate and clip class GRACE risk model showed better diagnostic information with regard to active and extensive coronary artery disease in patients with ACS⁸. Our study revealed that patients with higher GRACE risk score were associated with a greater extent of significant CAD. In our study there was a strong association of high GRACE score with severe TVCAD. Similar result has been found by others⁹.

Although age, ST deviation and biomarker status are common components of all three scores but haemodynamic variables are used in PURSUIT and GRACE only whereas renal dysfunction is exclusively used in GRACE giving it a powerful predictive value.

Risk scores are simple prognostication scheme that categorize a patient's risk of death and ischemic events. Their use can help tailor our therapies to match the intensity of the patient's NSTEMI ACS. Knowing how time plays an important role in the management of ACS patients, the faster we can identify the high-risk

patients the more the benefit can be achieved by administering the optimal treatment early.

Stratifying the patients into low, intermediate and high risk category, one finding

angiographic extent and severity of CAD. Patients with high GRACE score were more likely to have severe multi vessel CAD compared to those who have low scores. However, it should

Table-2: Correlation of GRACE Score with extent of CAD.

	Low	Intermediate	High	<i>p</i> value
SVCAD	28	24	04	0.0001
DVCAD	04	18	24	0.1465
TVCAD	0	06	32	0.0001

Table-3: Correlation of GRACE score with severity of CAD.

GRACE Risk	Subcritical CAD	Critical SVCAD/DVCAD/TVCAD	<i>p</i> value
Low	8	32	0.013
Intermediate	6	48	0.728
High	0	60	0.004

is remarkable that all patients with high GRACE score have critical disease on coronary angiogram. It suggests that all patients with high risk score should be treated with early invasive strategy in order to decrease the short and long-term morbidity and mortality¹⁰. The ideal score for risk stratification on admission for NSTEMI ACS patients should have a good balance between complexity and utility.

Previously GRACE risk model was considered a complex score when comes to calculate it but now with the use of personal digital assistant applications its use is very easy. Now we can say that complexity is in data collection rather than the methodology involved in calculations. Although GRACE seems to be an effective non invasive tool in predicting the extent and severity of coronary artery disease we would say that this is a single institution based study therefore it is essential to further validate this score for angiographic severity of coronary artery disease.

CONCLUSION

Our study demonstrated that, among patients presenting with NSTEMI ACS, GRACE Risk stratification shows a good correlation with

be emphasized that risk scores are clinical tools that can supplement but not replace sound clinical judgment.

REFERENCES

1. American Heart Association Heart and Stroke Statistical Update. 2001.
2. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet*. 1997; 349:1269-76.
3. Katriotis DG, George CM, Kastrati A, Arnoud WJ, Neumann FJ, Konstantinos CM. et al. Optimal timing of coronary angiography and potential intervention in non-ST-elevation acute coronary syndromes. *Eur Heart J*. 2011; 32:32-40.
4. Goncalves PA, Ferreira J, Aguiar C, Seabra-Gomes R. TIMI, PURSUIT, and GRACE risk scores: sustained prognostic value and interaction with revascularization in NSTEMI-ACS. *Eur Heart J*. 2005; 26:865-872.
5. Yusufali A, Zubaid M, Al-Zakwani I, Alsheikh-Ali AA, Al-Mallah MH, Al Suwaidi J, AlMahmeed W, Rashed W, Sulaiman K, Amin H. Validation of the GRACE Risk score for hospital mortality in patients with acute coronary syndrome in the Arab Middle East. *Angiology*. 2011; 62(5):390-6. Epub 2011 Feb 8.
6. Tang EW, Wong CK, Herbison P. Global Registry of Acute Coronary Events (GRACE) hospital discharge risk score accurately predicts long-term mortality post acute coronary syndrome. *Am Heart J*. 2007; 153(1):29-35.
7. Lakhani MS, Qadir F, Hanif B, Farooq S, Khan M. Correlation of thrombolysis in myocardial infarction (TIMI) risk score with extent of coronary artery disease in patients with acute coronary syndrome. *J Pak Med Assoc*. 2010; 60(3):197-20.
8. Nakachi T, Kosuge M, Hibi K, Ebina T, Tsukahara K, Okuda J, et al. comparison of grace risk score versus timi risk score on angiographic findings in patients with non-st-segment elevation acute coronary syndrome. ACC Poster Contributions Georgia World Congress Center, March 15, 2010.
9. Aqeedi RA, Sulaiman K, Al Suwaidi J, Al Habib K, Al Nelmar A, Panduranga P et al. Characteristics, management and outcomes of patients with acute coronary syndromes and prior coronary artery bypass surgery : finding from second Gulf Registry for Coronary Events. *Icvtvs* 2011.