

Echocardiographic Wall Motion Score in the Naive Patients of Non-ST Segment Elevation Acute Coronary Syndrome Regarding their Early Mortality

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ABSTRACT

Objectives: To evaluate the association of echocardiographic wall motion score (WMS) with early mortality (30-days) among patients with non-ST-Segment Elevation Acute Coronary Syndrome (NSTEMI-ACS).

Material and methods: This descriptive case series study was conducted at the cardiology department at LUMHS from October 2015 to March 2016. Patients with NSTEMI-ACS and positive cardiac biomarkers, patients older than 25 years, and both genders admitted to CCU were included. Standard indoor treatment was done in these patients. Evaluation of wall motion score was done by echocardiography by 2D echo. All patients were monitored for early cardiac event-related mortality (30 days). The self-made Performa logged all of the information gathered. SPSS version 26.0 was used to analyze all of the data.

Results: In this study, a total of 148 cases of NSTEMI-ACS were studied. Most of the patients were aged more than 40 years, and males were in the majority 93(62.8%). Regional wall motion was in 105(70.9%) of the cases. In 88(59.5%) of the cases, the ejection fraction was <40% and in 58(40.5%) of the cases it was >40%. CKMB was raised in 69(46.6%) of the cases, and troponin T was positive in all of the cases. The overall short-term mortality rate was 20.3%, which was significantly associated with a high grade of wall motion score (p=0.001).

Conclusions: It was concluded that echocardiographic wall motion score was correlated significantly to short-term mortality (30-day) among new patients presented with NSTEMI-ACS.

Keywords: Acute coronary syndrome, WMS, NSTEMI, early mortality

INTRODUCTION

Acute coronary syndrome (ACS) occurrences now account for a higher percentage of non-ST-segment elevation acute coronary syndromes (NSTEMI-ACS) than ST-segment elevation myocardial infarctions (STEMI).¹ The early identification and timely treatment of ACS are crucial because of the enormous morbidity and death it causes. The most frequent cause of NSTEMI-ACS is the result of the rupture of an atherosclerotic plaque within the coronary arteries, involving myocardial ischemia and injury, commonly resulting from a partial or intermittent occlusion along the ischemic sequence.² In NSTEMI-ACS, epicardial flow is frequently preserved despite an angiographically considerable stenosis being present. As a result, many treatment plans for coronary angiography and revascularization have been researched over time.³ Choosing between a routine invasive and a selected invasive method is the first stage. A selective invasive method involves coronary angiography exclusively in conditions of refractory angina and/or inducible ischemia by non-invasive stress testing, while angiography must be done within 24 to 72 hours as part of a standard invasive approach.³ Compared to the patients who arrived with unstable angina, those who had NSTEMI had a decreased 6-month death rate.⁴ Diabetes severity, the existence of peripheral vascular disease, renal impairment, and dementia are examples of comorbid diseases that have an impact on mortality and morbidity in addition to the degree of troponin elevations.⁴ The measurement of MACEs in cases receiving revascularization has also benefited from the use of wall motion scores (WMSs).^{5,6} Subsequent studies have assessed the relevance of the WMS in predicting MACEs in patients having PCI, and the degree of left ventricular function impairment has also been linked to unfavourable cardiovascular events. It is still not clear if using a measure that combines the WMS and SSII would help predict outcomes for people getting PCI because it has not been studied well.^{5,6} The left ventricle is separated into several segments in the 17-segment model, which is then used to compute the WMS in accordance with the advice of the American Society of Echocardiography.⁷ Each segment's contractility is graded using the following system: Normal is number one, followed by hypokinesia, dyskinesia, akinesia, and ventricular aneurysm. Two

separate, skilled cardiologists independently examine all factors.^{6,7} Nevertheless, they conducted the measurements during the hyper acute phase, when the compensating hyperkinesia was at its peak and could imagine a bias that should diminish over time as the hypercontractile components regain normal function. Some studies have looked at how well both tests can predict bad things that will happen after an AMI.⁸⁻¹⁰ It is difficult to identify and choose a treatment plan for individuals with suspected non-ST elevation myocardial infarction (NSTEMI) before they arrive at the hospital. By utilizing more expensive and sophisticated imaging modalities, it has diagnostic and prognostic accuracy comparable to stress testing.^{11,12} When compared to ETT alone, echocardiography can reveal anatomical and functional information about the heart that is not achievable with ETT alone. It can also be completed quickly at the patient's bedside. Utilizing doppler technology, it is also able to learn about flow irregularities and examine irregularities in wall motion.¹¹ This study has been conducted to determine the association of Echocardiographic Wall Motion Score (WMS) with short-term mortality (30 days) among new cases of Non-ST-Segment Elevation Acute Coronary Syndrome (NSTEMI-ACS).

MATERIALS AND METHODS

Study setting and design: This descriptive, cross-sectional study was done at the cardiology department of Liaquat University of Medical and Health Sciences.

Duration of study: From October 2015 to March 2016

Sample size: A total of 148 patients were randomly selected.

Inclusion criteria: Patients presented with first Non-ST-Segment Elevation Acute Coronary Syndrome (NSTEMI-ACS) and positive cardiac biomarkers, aged ≥ 25 years and of either gender were included.

Exclusion criteria: All the cases having STEMI, a history of previous infarction, individuals in whom the non-ST-ACS diagnosis was uncertain, patients with LBBB according to ECG, cases having dilated or hypertrophic cardiomyopathy, patients having acute pulmonary edema, and those who were in shock were excluded.

Data collection: All patients with chest pain who were hospitalized in the CCU and underwent ECGs, biomarkers, and echocardiography were enrolled in the study as per inclusion

criteria. After taking demographic information, the clinical examination, electrocardiogram (ECG), and required laboratory investigations were done as per diagnosis and management protocol. Within 24-48 hours of hospitalization, the cardiac enzyme CK-MB, troponin T were assessed, and echocardiography were done. Trop T was performed qualitatively by the Roche Germany Trop T kit. Standard indoor treatment was provided to these patients of NSTEMI-ACS. Evaluation of wall motion score was done by echocardiography by 2D echo. To evaluate the semi-quantitative assessment of regional systolic function, the wall motion score index is important. Each segment was examined separately and scored based on systolic thickening and motion. The above score is a five-level rating that is defined as follows: 5 = Aneurysm, 4 = Dyskinesis, 3 = Akinesis, 2= Hypo kinesis and 1 = Normal. All patients were monitored for early cardiac event-related mortality (30 days). The self-made Performa logged all of the information gathered. SPSS version 26.0 was used to analyze all of the data.

RESULTS

In this study, a total of 148 cases of NSTEMI-ACS were studied. Most of the patients were aged more than 40 years, and males were in the majority 93(62.8%), while females were 55(37.2%). Regional wall motion abnormalities were in 105(70.9%) of the cases, while in 43(29.1%) of the cases it was not found. In 88(59.5%) of the cases, the ejection fraction was < 40% and in 58(40.5%) of the cases it was >40%. CKMB was raised in 69(46.6%) of the cases, and troponin T was positive in all of the cases. Table.1

The overall short-term mortality rate was 20.3%, which was significantly associated with a high grade of wall motion score (p<0.001). Table.2

Table.1 Descriptive statistics of demographic and clinical variables n=148

| Variables | | Statistics | |
|------------------------------------|------------|------------|------------|
| Age groups | 25-35 | 08 (5.3%) | |
| | 36-45 | 09 (6.0%) | |
| | 46-55 | 63 (42.6%) | |
| | 56-65 | 30 (20.0%) | |
| | >65 | 38 (26.0%) | |
| Gender | Male | 93(62.8%) | |
| | Female | 55(37.2%) | |
| Regional Wall Motion abnormalities | Yes | 105(70.9%) | |
| | No | 43(29.1%) | |
| Ejection fraction (EF) | <40% | 88(59.5%) | |
| | ≥40% | 58(40.5%) | |
| Cardiac enzymes | CK-MB | Raised | 69(46.6%) |
| | | Normal | 79(53.4%) |
| | Troponin T | Positive | 148(100.0) |
| | | Negative | -- |

Table.2. Wall motion score and short-term mortality n=30

| Wall motion score and short-term mortality | | | | | p-value |
|--|---------|---------|---------|-----------|---------|
| Wall motion score | 1 | 2 | 3 | 4 | |
| Mortality | 2(1.4%) | 4(2.7%) | 8(5.4%) | 16(10.8%) | 0.001 |

DISCUSSION

In this study, a total of 148 cases of NSTEMI-ACS were studied. Most of the patients were aged more than 40 years, and males were in the majority 93(62.8%), while females were 55(37.2%). Consistently, Kinsara AJ et al¹³ reported that the overall average age of the patients was 64.52 ± 12.56 years and males were in majority 78.48%, while females were only 21.52%. On the other hand, Radovanovic D et al¹⁴ reported that the NSTEMI affected 21327 individuals; 73% of males with an average age of 63.912.8 years and 27% of females with an average age of 71.7±12.5 years. In this study, the regional wall motion was abnormalities were in 105(70.9%) of the cases, while in 43(29.1%) of the cases not found, in 88(59.5%) of the cases the ejection fraction was <40% and in 58(40.5%) of the cases it was >40%. Manfredonia L et

al.,¹⁵ reported that the regional wall motion abnormalities were identified on an echocardiogram in 52.8% of participants. Stress linked cardiomyopathy syndrome spectrum is characterized by the solely neurogenic stunning, which appears as short-term regional wall-motion abnormalities (RWMA) beyond the supply region of a single coronary artery (and often without any major coronary stenosis).^{16,17}

In this study, the overall short-term mortality rate was 20.3% Which was significantly assisted by the high grade of wall motion score (p<0.001). In the study of Kumar D et al¹⁸ reported that at six months, the death rate for individuals having NSTEMI-ACS was reported to be 10%; however, information on these individuals' post-discharge outcomes is scant, particularly in the region of South Asia. According to the study by Kim HK et al.¹⁹ based on the Korea Acute Myocardial Infarction Registry, the death rate following NSTEMI was 14.3% after one year. WMS is now the most used and well-validated index in echocardiography, and it offers the best option for measuring systolic function following acute myocardial infarction.^{6,20} According to Jurado-Román et al²¹ the examination of wall motion segments may provide a more reliable prognostic marker than LVEF, particularly when myocardial damage is less severe. The survival rate decreases with an increasing wall motion score index and an ischemia-free stress period.²² Dobutamine and dipyridamole tests have been found to have comparable predictive values when compared to other pharmacological stress modalities.²² Hard cardiac episodes can be predicted by overexpression ischemia at stress echocardiography, as well as the risk is correlated with the magnitude of the inactivating abnormality as measured by the maximum wall motion score index.^{22,23}

CONCLUSION

It was concluded that the echocardiographic wall motion score was found to be strongly linked with short-term death within 30 days among patients having early non-ST-Segment elevation acute coronary syndrome. More detailed studies are needed to determine the precise correlation between the wall motion score and short-term mortality in individuals with early non-ST-Segment elevation acute syndrome.

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