

## Correlation between CHA<sub>2</sub>DS<sub>2</sub>-VASc Score and LV Longitudinal Strain in Acute Coronary Syndrome

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### Abstract

**Objective:** To examine the predictive efficacy of CHA<sub>2</sub>DS<sub>2</sub>-VASc score in predicting CAD severity with respect to SYNTAX (Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery) and GLS in patients with Acute Myocardial Infarction (AMI) severity. Patients with atrial fibrillation (AF) are assessed for thrombotic risk using the CHA<sub>2</sub>DS<sub>2</sub>-VASc score. In patients with an acute coronary syndrome, regardless of AF, was recently demonstrated to predict severe unfavourable clinical outcomes. **Methods:** ACS patients who had had coronary angiography were separated into three groups based on their SYNTAX scores and a total of 577 individuals were included in this study retrospectively (low, intermediate, and high). Each patient's CHA<sub>2</sub>DS<sub>2</sub>-VASc score was computed. The participants were divided into three groups for the study. Zero, one, two, three, or four.

**Keywords:** Acute coronary syndrome, CHA<sub>2</sub>DS<sub>2</sub>-VASc score, LV global longitudinal strain, severity of coronary artery disease.

### 1. Introduction

There is a broad range of cardiovascular (CV) causes of morbidity and death in individuals with acute coronary syndrome (ACS). [1]

Myocardial ischemia with abrupt symptoms is known as an acute coronary syndrome (ACS), and it occurs when the heart's oxygen demand isn't significantly increased by any external factors. Chronic coronary atherosclerosis-related lesions are the most common cause of acute coronary syndrome (ACS). ACS may appear as either ST segment elevation or non-ST segment elevation on the first ECG, depending on the patient's symptoms. [2].

Medical therapy and invasive coronary angiography (CAG) are the primary therapeutic options for ACS (3, 4). CAG determines the severity of CAD, which determines the most prevalent therapy for ACS (3, 5). According to various coronary lesions' characteristics, a web-based score called SYNTAX (which stands for "Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery") has been developed [6].

Patients with coronary artery disease (CAD) may benefit from the incorporation of speckle tracking echocardiography (STE) into clinical practise, which has been validated for diagnosis and risk stratification in a variety of cardiac diseases [7,10].

There are numerous ways in which speckle tracking analysis may be used to determine the usual ischemic subendocardial damage. subendocardial fibres of all cardiac chambers; a bull's eye image of left ventricular global LS (LVGLS) that allows a regional assessment of LV damage according to coronary vascularization areas; and longitudinal strain (LS), which is the most often utilised STE measure [13]

When patients with atrial fibrillation (AF) were evaluated, the CHA<sub>2</sub>DS<sub>2</sub>-VASc (congestive heart failure, hypertension, age 75 years (doubled), diabetes mellitus, prior stroke or transient ischemic attack [TIA] (doubled), vascular disease, age 65-74 years, female gender) score was initially used [14]. Predicting

cardiovascular events in individuals with atrial fibrillation is easier than ever with the use of the CHA<sub>2</sub>DS<sub>2</sub>-VASc risk score, which has been validated and consistently repeatable [15]. The CHA<sub>2</sub>DS<sub>2</sub>-VASc score has recently been linked to poor clinical outcomes in patients with stable coronary artery disease (CAD) and acute myocardial infarction (MI), even when AF was not present (16, 17). Preprocedural CHA<sub>2</sub>DS<sub>2</sub>-VASc score and SYNTAX score association in predicting CAD severity in patients presenting with ACS is the purpose of this research.

### 2. Patients and methods

This was a prospective cohort research conducted for one year at the Department of Cardiology, Benha University from 1/2020 to 1/2021.

All subjects received informed consent. A total of 577 ACS patients have been chosen via purposeful sampling based on the specified.

For each patient, a detailed medical history, thorough clinical examination, standard 12-lead electrocardiogram, and conventional echocardiographic examination were performed. Left ventricular ejection fraction was measured by echocardiography using a biplane modified Simpson's method with the GE Vivid 7 (GE Healthcare, Milwaukee, Wisconsin). Blood samples were obtained Fasting blood glucose, total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol, triglycerides, and renal function tests were performed .)

Clinical and demographic characteristics including age, gender, diabetes mellitus (DM), smoking, family history of premature CAD, chronic heart failure, previous ischemic stroke or TIA, and peripheral artery disease (PAD) were obtained

CAG was performed and Significant CAD was diagnosed if there was  $\geq 50\%$  diameter stenosis in at least  $\geq 1$  major epicardial coronary artery. The severity of CAD was determined by the number of significantly diseased coronary arteries. Multivessel coronary disease was defined as the presence of 50% luminal diameter

stenosis involving at least 2 major epicardial coronary arteries. Left main coronary artery narrowing of 50% was considered as 2-vessel disease. Syntax score was calculated visually from CAG. By combining anatomic and clinical prognostic variables, the SYNTAX score II creates accurate mortality predictions to guide the choice between PCI and CABG for patients with multivessel coronary disease. The CHA2DS2-VASc score was calculated by assigning one point each for the presence of chronic heart failure, HTN, DM, vascular disease, age 65–74 years, female gender (as a sex category) and by assigning two points for history of stroke or TIA and age  $\geq 75$  years. The score of CHA2DS2-VASc was then computed and the research

participants split into three groups. CHA2DS2-VASc score (0–1, 2–4 or  $\geq 5$ ).

### 3. Results

A total of 577 patients were studied, including 376 (65.2%) male and 201 (34.8%) female. Patients were classified into three tertiles according to their SS: tertile 1 had an SS  $< 22$ ; tertile 2 had an SS of 22–32; and tertile 3 had an SS of  $> 32$ . The baseline, clinical, and laboratory characteristics of the study population stratified according to SS tertile were presented. Patients with higher SYNTAX score were significantly older than patients with intermediate and low SYNTAX score with p value 0.0001.

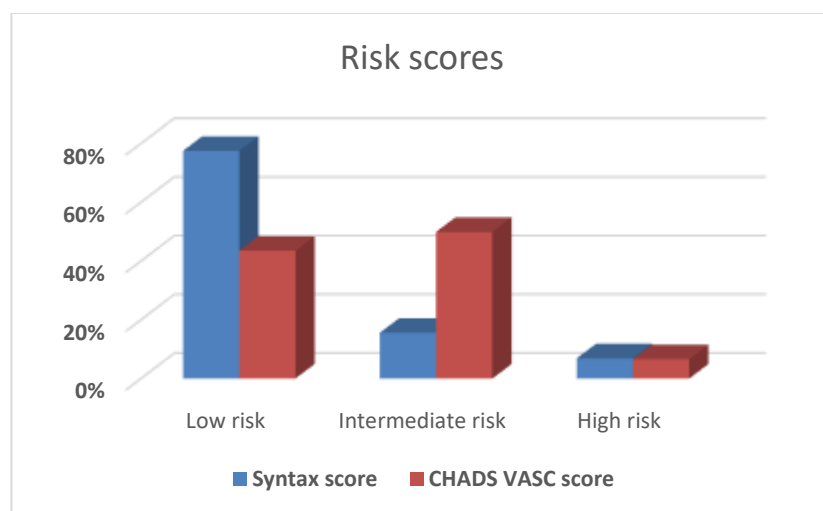


Fig. (1) Bar chart showing risk stratification of the included patients.

Table (1) Baseline clinical characteristics of the study groups according to SYNTAX score tertiles.

		Syntax grade						P value
		$\leq 22$		23-32		$\geq 33$		
		N/ Mean $\pm$ SD	%/ range	N/ Mean $\pm$ SD	%/ range	N/ Mean $\pm$ SD	%/ range	
Age (years)		56.8 $\pm$ 11	25-95	62.2 $\pm$ 1.6	35-97	67.7 $\pm$ 10.6	50-90	0.0001
Gender	F	145	72.1%	38	18.9%	18	9.0%	0.07
	M	302	80.3%	52	13.8%	22	5.9%	
CHF	No	424	94.9%	60	66.7%	28	70.0%	0.0001
	I	0	0.0%	1	1.1%	0	0.0%	
	II	17	3.8%	17	18.9%	8	20.0%	
	III	6	1.3%	12	13.3%	4	10.0%	
HTN		194	43.4%	57	63.3%	29	72.5%	0.0001
DM		166	37.1%	45	50.0%	24	60.0%	0.0001
Stroke		6	1.3%	6	6.7%	4	10.0%	0.0001
2D EF (%)		57.4 $\pm$ 9.5	30-85	45.2 $\pm$ 9.9	20-72	39.6 $\pm$ 6.8	25-57	0.0001
CHADVASC		1.6 $\pm$ 1.3	0-5	2.8 $\pm$ 1.5	0-6	3.9 $\pm$ 1.6	1-7	0.0001

There was a statistically significant difference between SYNTAX score tertiles in terms of degree of CHF, as grade III CHF was most prevalence among high SYNTAX score with p value 0.0001. HTN was significantly more prevalent among high SYNTAX score group with p value 0.0001, nonetheless, 2D ejection fraction was the significantly lower and among

high SYNTAX score with p value 0.0001. CHAVASC score was significantly higher among high SYNTAX group with p value 0.0001 and showed good correlation with GLS (p value  $< 0.001$ ).

#### 4. Discussion

This research found that patients in the highest SYNTAX score tertile were older and had poorer LVEF than those in the intermediate and lower SYNTAX score tiers. Hypertension and diabetes mellitus were also more prevalent in the top tier.

Males accounted for 68.4 percent of the population and had an average age of 65.5 +/- 11.5 years, according to Harutyunyan M., et al., 2021. More advanced CAD, such as 3-vessel and left-main (LM) CAD, was linked to a higher CHADS-VASc morbidity burden. It is estimated that 16.3 percent of patients with the lowest CHADS-VASc score were found to have 3 vessel disease, while 20 percent were found to have it, and 2.3 percent were found to have it. Patients who scored 6 or higher had 31.2 percent 3 vessel disease, while those who scored 6 and/or 7 were found to have 31.2-percent three-vessel disease (p0.0001). For example, according to Cetin M et al. (2014), the CHA2DS2-VASc score and the Gensini score both had significant correlations with the number of sick vessels ( $r = 0.308$ ,  $p 0.001$ ). Another study found that the Chadsvasc score was a stronger predictor of the existence and severity of coronary artery disease (CAD) than the chads score.

#### 5. Conclusion

It is possible to utilise CHA2DS2-VASc scores to predict the severity of CAD determined by the syntactic score and its substantial connection with GLS.

#### 6. Limitations

In this single-center investigation, SS was determined visually rather than using intravascular ultrasonography; more prospective trials with long-term follow-up are needed.

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