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Tombstone St-Elevation in Acute Anterior Myocardial Infarction

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Abstract

Tombstone ST-elevation myocardial infarction (STEMI) is a rare variant of STEMI leading to worse clini-cal outcomes. We report a case of a 56-year-old male patient, with a history of being a smoker, and suffer-ing from chronic hypertension, who was admitted to the Coronary Intensive Care Unit(CICU) with the di-agnosis of acute ST-elevation myocardial infarction (STEMI) of the anterior wall type in complicated tomb-stone with severe pump failure Killip III-IV, who died during percutaneous coronary intervention (PCI), due to a severe ventricular arrhythmia that ends in ventricular fibrillation. A presentation of the type or tombstone-shaped STEMI is made as a poor prognosis related in this case by a thrombotic occlusion of the proximal LAD coronary artery showing in the necropsy a severe atherosclerotic disease of the coronary arteries with transmural myocardial infarction of the anterior wall.

Keywords: *Tombstone-STEMI, Coronary Intensive Care Unit (CICU), Percutaneous Coronary Inter-vention (PCI), Electrocardiogram (ECG)*

Introduction and Background

In relation to the top 10 causes of death in Cuba, heart disease ranks first with a rate of 238.1 per 100,000 inhabitants, followed by death from malignant tumors, whose rate is 223.0, both causes explain 47.5% of total deaths in 2019. 61.3% of deaths from heart disease occur from ischemic diseases, of which 44.2% from acute myocardial infarction. It is presented on female mortality, for chronic ischemic heart disease, other acute ischemic heart diseases and chronic rheumatic heart diseases [1].

Acute myocardial infarction has high in-hospital mortality rates, generally due to malignant ventricular arrhythmias or severe ventricular dysfunction. The development of units dedicated to these patients, with continuous monitoring and specialized nursing, could allow rapid treatment of these arrhythmias and improve the prognosis, on the other hand, cardiogenic shock (CS) complicates the evolution of up to 10% of cases of STEMI, being the most frequent cause of death in these patients. Urgent reperfusion has been, to date, the only therapy shown to increase survival in patients with acute coronary syndrome (ACS) in CS. However, CS has high in-hospital mortality in all registries (around 40-50%) and is an independent predictive value of long-term mortality in the survivor.

The limited resources available to treat CESTI in low- and middle-income countries require a significant international effort to strengthen primary prevention pro-gramme [2,3]

In the 4th Universal Definition of Myocardial Infarction of 2018, the detection of the value of biomarkers in the diagnosis and prognosis of ACS defines as myocardial injury values of cardiac troponin (cTn) elevated above the 99th percentile upper limit of reference. The injury is considered acute if there is a rise and/or fall in cTn values mainly accompanied by symptoms of acute myocardial ischemia with new changes in ischemic electrocardiogram or development of pathological Q-waves; In addition, there is myocardial injury from imaging evidence of new viable myocardial loss or new re-gional abnormality of wall movement in a constant pattern with an ischemic etiology and identification of a coronary thrombus by angiography including intracoronary imaging or by autopsy [4].

Case Report

A 56-year-old male patient with a past medical history of chronic hypertension who is treated irregularly with Captopril and of being a smoker (1pac/day) as cardiovascular risk factors, and family history of a father who died of a myocardial infarction. He was admitted to the coronary in-tensive care unit (CICU) for chest pain last-ing more than half an hour, related to emotional stress and accompanied by pallor, sweating. In the emergency ECG changes suggestive of a STEMI in the leads DI, aVL and V2-V6 plus subendocardial injury in the inferior wall due to mirror changes. Physical examination on admission revealed dyspnea on the decubitus position. Low-tone heart sounds, tachyarrhythmic due to the presence of premature ventricular beats, heart murmurs are not auscultated, distal thermal gradient in lower limbs. BP of 86/48 mmHg. HR of 118 beats per minute. Respiratory system with audible vesicular murmur in lung fields and presence of crackling rales.

Complete Blood Count:

WBCs: Leukocytosis with predominance of segmented, Glucose: 293mg/dl, rest of normal blood profiles. Basal CPK:1276U

Basal EKG: Sinus rhythm, ST-segment elevation of the anterior wall in the form of a Tombstone that generates ventricular tachycardia (and ventricular fibrillation Figure. 1

Simple chest X-ray: Normal cardiac silhouette, signs of pulmonary congestion.

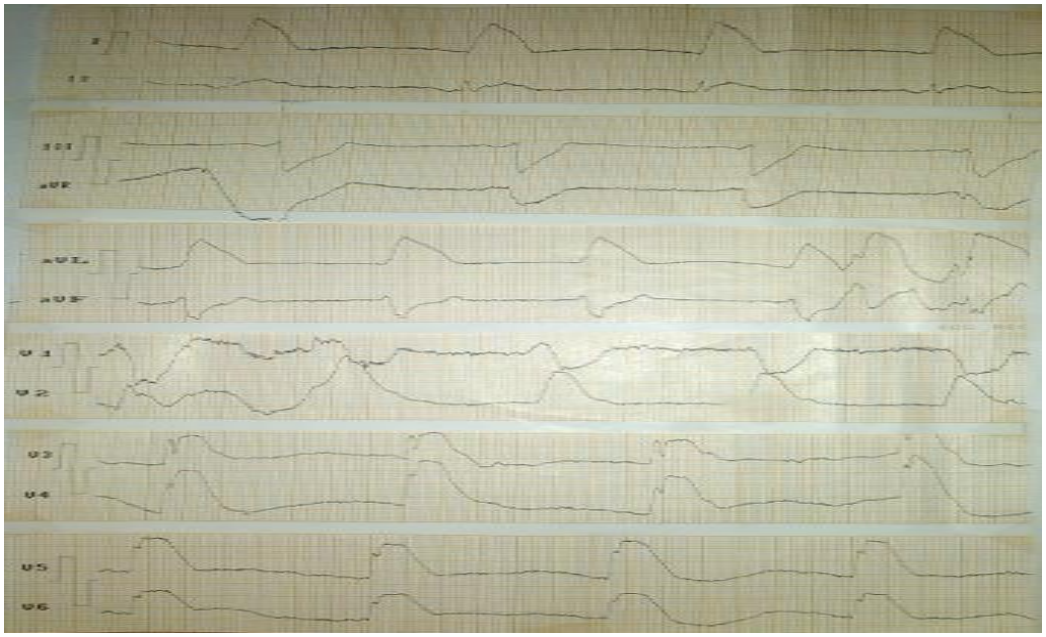

Figure 1 ECG of the patient on admission with extensive anterior wall STEMI in the form of a Tombstone or tombstone in the chest leads.

Clinical Evolution

Extensive anterior wall STEMI that evolved to severe pump failure and died during the PCI procedure.

Discussion

The Tombstone STEMI or tombstone of the English word that designates the tombstone of a grave or a tomb is a type of ACS with a characteristic ST morphology that is observed in the initial period of the STEMI between 10% and 22% of cases associated with a worse prognosis due to the large extension of the myocardial injury. It was in 1993, H. S. Wimalaratna the first to publish in The Lancet a letter from the editor entitled "Tombstoning" of ST-segment in acute myocardial infarction. Since then, the expression tombstoning of ST-segment is designated to the typical and rapidly progressive convex elevation of the ST-segment reminiscent of a tombstone. The electrocardiographic sign consists of a significant elevation of the ST-segment of superior convexity, which is confused with the T-wave and exceeds in height the pre-ceding R-wave. The English name is a play on words of double meaning: on the one hand, it reflects the characteristic aspect of this alteration of the ST-segment, whose layout reproduces the characteristic shape of a tombstone; and on the other, it reflects the worse prognosis of this electrocardiographic alteration as a sign of a STEMI [5].

The Wimalaratna criteria were modified by Guo et al. and are: The ST-segment of superior convexity and fusion with the descending branch of the R-wave or with the ascending portion of the QS/QR, the peak of the ST-segment is higher than what re-mains of the R-wave, the ST-segment merges with the ascending branch of the next T-wave and R-wave absent or of minimum amplitude of 4 to 6 mm disappearing the depression that follows the R5-7 wave. Goldman in the AMI chapter in the early acute phase begins in a few minutes, per-sists and evolves over hours. T-waves in-creases in amplitude and extend over the area of injury (hyperacute pattern). ST-segments evolve from a concave pattern to a straight morphology and an upward con-vex pattern (acute pattern). When important, the acute pattern of fused ST-T wave injury takes on the appearance of a "tombstone" [8].

Extremely rapid and myocardial damage is related to the poor existence of collateral flow, associated with diffuse coronary heart disease, an inadequate protective effect of the myocardium in relation to pre-infarction angina (ischemic preconditioning) and elevated wall tension. These hypotheses are based on the fact that severe ischemia in an unprepared myocardium result in extensive myocardial damage. Pre-infarct angina is associated with the development of col-lateral vessels and ischemic precondition-ing, which would be absent in AMI with "ST on tombstone" [9,10].

There are other electrocardiographic patterns of poor prognosis in the evolution of STEMI within these are Wellens Syndrome (SW) and Winter's ST-T pattern, related by thrombotic occlusion of the proximal anterior descending coronary artery, that evolve to the previous extensive AMI of high mortality. Wellens syndrome is an entity characterized electrocardiographically by the presence of inverted or biphasic T-waves in right cheat leads; which categorize it into two different types: a) Type I found in 24% of cases, presents biphasic T-waves in derivatives V2 and V3 with a negligible or nonexistent elevation of the ST-segment. b) Type II is the most frequently found, it is characterized by the presence of inverted, deep and symmetrical T-waves in right chest leads, although they can also be found from V1 to V5.[11] On the other hand, the electrocardiographic pattern type ST-T of Winter in the ECG there is downward slope with an ascending ST-segment (up-ward slopping and peaked/hyperacute and symmetrical T-waves [12]

Due to the unfavorable prognosis of these electrocardiographic patterns, it is recommended to offer a more aggressive therapy opting for PCI with mechanical reperfusion of patients with STEMI in tombstone or tombstone [13], the key to recognition is fundamental for proper treatment. Due to the almost complete occlusion of the anterior descending artery, performing a stress test, either stress test or pharmacological, carries a high risk of overt myocardial infarction [14].

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