Wellens syndrome: A warning sign of an impending "catastrophe"

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ABSTRACT

The term acute coronary syndrome includes a set of symptoms and signs attributable to acute myocardial ischemia that is generally due to the rupture or erosion of an atherosclerotic plaque with the consequent formation of a thrombus that totally or partially obstructs the involved coronary artery. It has a wide range of clinical presentations. The electrocardiogram plays an important role in the diagnosis and treatment of acute coronary syndrome, the spectrum includes a normal electrocardiogram, T-wave abnormalities, ST-segment depression, or ST-segment elevation. It is also useful for acute coronary syndrome presentations that are not so typical and can sometimes go unnoticed, such as right or left bundle branch block, posterior wall myocardial infarction, de Winter T wave pattern, and Wellens syndrome. A case of Wellens syndrome was identified in an outpatient cardiology consultation, the patient was immediately referred for urgent invasive coronary angiography, and as a result, a stent was successfully implanted from the ostium of the anterior descending coronary artery. The early identification of these variants is valuable so that the patient receives optimal drug treatment and is referred on time to invasive coronary angiography. The role of the echocardiogram with strain imaging and its contribution to the diagnosis is highlighted.

Keywords: Acute coronary syndrome, Wellens syndrome, Pseudo-normalized T-waves, Echocardiogram.

INTRODUCTION:

Wellens syndrome was first described in 1982 by Wellens and colleagues. It is suggestive of anterior wall ischemia classically. Wellens syndrome describes a pattern of electrocardiographic (ECG) changes, particularly deeply inverted or biphasic T waves in leads V2-V3, that is highly specific for critical proximal stenosis of the left anterior descending (LAD) coronary artery. Typically, when patients present to the hospital, they are pain-free, and usually, cardiac enzymes are normal or slightly elevated. Patients with these features who are not brought to invasive coronary angiography (ICA) will develop an extensive anterior wall myocardial infarction. The treatment typically involves cardiac catheterization with percutaneous coronary intervention (PCI) to relieve the occlusion.[1]

As a whole, the patients are admitted to the hospital with the diagnosis of unstable angina (UA) with the typical ST-T segment changes suggestive of critical stenosis in the proximal LAD, de Zwaan and et al., evaluated 1260 patients consecutively admitted to the hospital because of UA, 180 of them had the ST-T changes suggestive of critical stenosis in the proximal LAD, most of them the abnormalities were present at the time of admission. The result of invasive coronary angiography showed 50% or more narrowing in the proximal LAD in all patients.[2]

The mechanism for this ECG pattern remains unclear. The ECG pattern is maintained for the following days even after revascularization, first the T wave normalizes, and then the ST segment. Some consider that the Wellens syndrome pseudo-normalized T-waves likely reflect the development of unstable angina pectoris into the hyperacute phase of ST-segment elevation myocardial infarction.[3,4]

The echocardiogram is a non-invasive test of undoubted value in the context of acute coronary syndrome (ACS), useful in the diagnosis and prognosis. Most patients with the Wellens pattern are free of symptoms at the time of consultation and myocardial damage markers are within normal or slightly increased parameters. Therefore, detecting regional wall motion abnormalities leads to a correct diagnosis and immediate referral to invasive coronary angiography.[5] If global longitudinal strain (GLS) by speckle tracking echocardiography is available seems to be an important additive method for the evaluation of left ventricular function with improved reproducibility compared with left ventricular ejection fraction (LVEF).[6]

Wellens patterns are not exceptional to ACS. In recent years, cases with electrocardiographic changes like Wellens pattern (pseudo-Wellens syndrome) have been identified in conditions such as persistent juvenile T wave, bundle branch blocks, cerebral hemorrhage, pulmonary edema, pulmonary embolism, pheochromocytoma, Takotsubo syndrome, digitalis, cocaine-consumption, and sepsis induce-cardiomyopathy.[7,8,9]

CASE REPORT

A 60-year-old male patient, smoking for 40 years, previous medical history of arterial hypertension for 5 years, and dyslipidemia, came to the cardiology consultation complaining of chest pain in the last week and several daily episodes unrelated to the effort. ECG showed sinus rhythm, normal heart axis, deeply biphasic T waves in leads V2-V3, and T waves negative in V4-V5 (Figure 1). Lab tests showed: Hemoglobin 146 g/l, Creatinine Clearance 67 mL/min, Total cholesterol 6.22 mmol/L, LDL cholesterol 4.38 mmol/L, glycate hemoglobin 5.9%, first Troponin 25.3 ng/L and second troponin 15.06 ng/L.

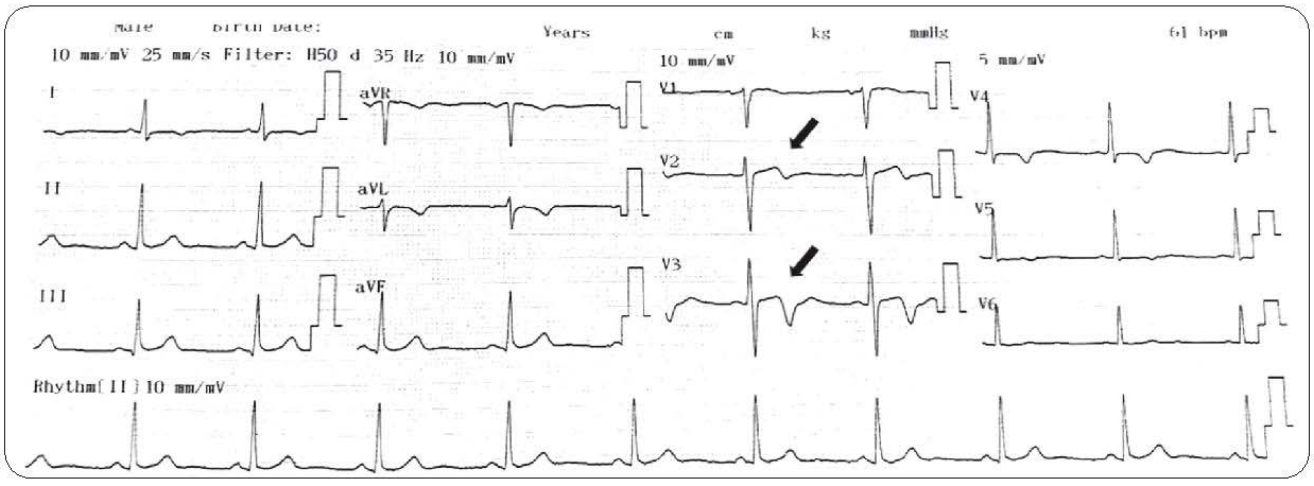

***Figure 1**. ECG shows sinus rhythm, normal heart axis, negative T wave in DI, AVL, V4, and V5, and biphasic T waves in leads V2-V3.*

Invasive coronary angiography was performed which showed critical stenosis in the proximal segment of the LAD artery (Figure 2-A). A successful Percutaneous Coronary Intervention was performed implanting a 3.0x18 mm drug-eluting stent from the LAD ostium (Figure 2-B).

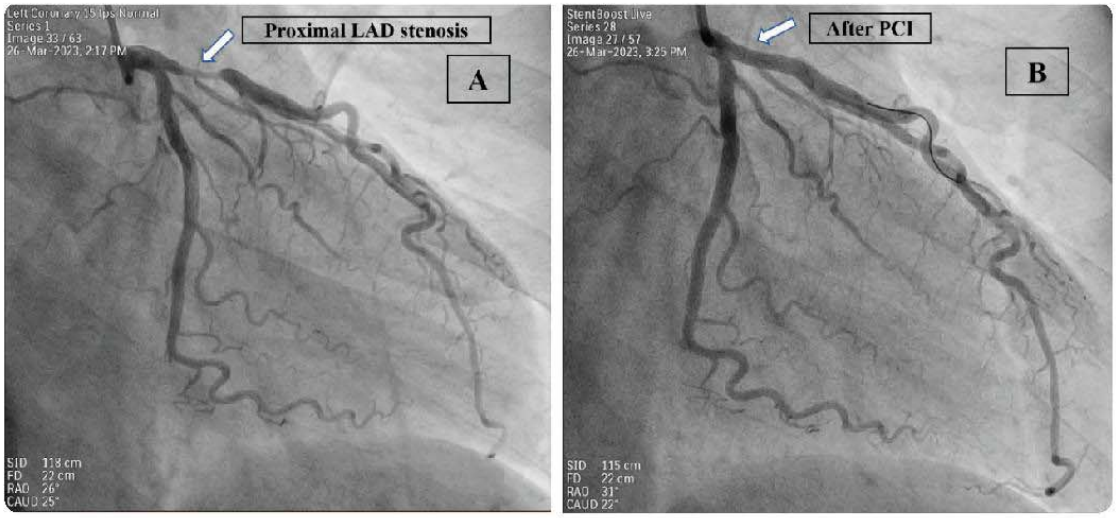

Figure 2. *(A) Invasive coronary angiography shows severe stenosis in the proximal segment of the left anterior descending artery. (B) Successfully percutaneous coronary intervention (PCI) on the left anterior descending artery (LAD)*

The transthoracic echocardiogram reported normal left ventricle geometry, normal global left ventricle systolic function, and hypokinesis of the anterior wall (mid-apical segment). Using the Teicholz and Simpson methods LVEF was assessed with values of 62% and 58 % respectively, mitral annular plane systolic excursion (MAPSE) 10.9 mm, GLS Endo Peak Avg -16.5% with decreased strain in anterior wall (basal-mid-apical segment) and basal septum (Figure 3-A). Normal right ventricle systolic function, tricuspid annular plane systolic excursion (TAPSE) 19 mm. Left ventricle diastolic dysfunction grade I, left atrium Reservoir strain 40.2 %. Low probability of pulmonary hypertension.

The echocardiogram performed seven days after the PCI highlighted the following: No regional wall motion abnormalities, Teicholz and Simpson LVEF 68% and 65% respectively, MAPSE 14,3 mm, GLS Endo Peak Avg -24.2% (Figure 3-B).

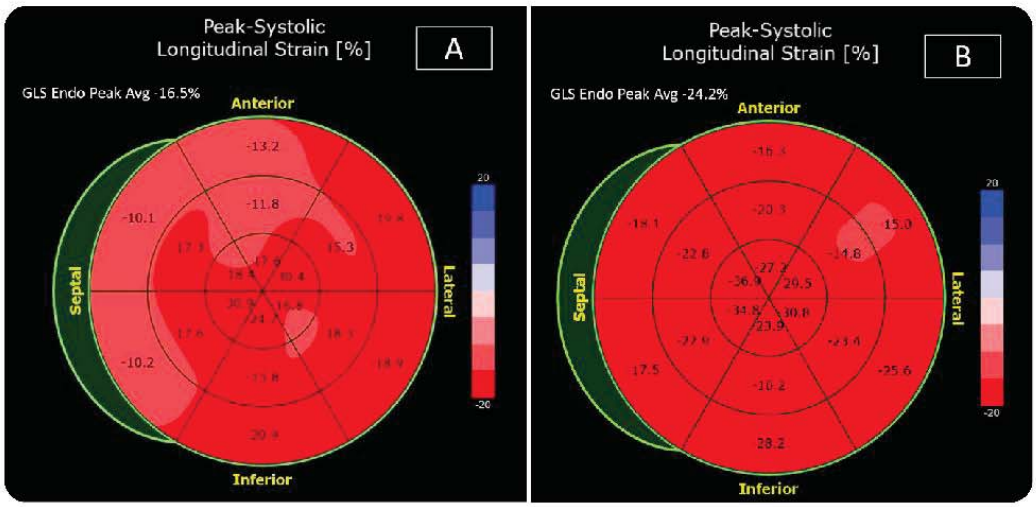

Figure 3. *(A) Global Longitudinal Strain Endo Peak Avg -16.5%. (B) Global longitudinal Strain Endo Peak Avg -24.2%*

The patient presented a satisfactory evolution after seven days of medical treatment in the Coronary Intensive Care Unit and subsequently in the hospitalization room until discharge.

DISCUSSION

Wellens syndrome can be divided into two types according to the precordial T wave pattern seen during the pain-free period. In type A, there are biphasic T waves typically observed in V2 and V3. In Type B, which is the most common form, there are deep, negative T waves in leads V2 and V3.[10,11,12] This patient presented a Type A pattern and maintained the same pattern after seven days. Most of the cases reported in the literature normalize the ECG in days to a few weeks. Recognizing this pattern on the ECG is particularly important in emergency-related professionals, as missing this high-risk group of patients could have catastrophic consequences.

There are a few data on patients with Wellens syndrome, Zhou L, et al., evaluated a total of 2127 patients with ACS who underwent angioplasty on LAD, according to electrocardiographic criteria, they identified 200 with Wellens patterns. Wellens syndrome was often manifested as non-ST-elevation myocardial infarction (NSTEMI) and at a median follow-up of 24 months, Wellens syndrome was not associated with an increased risk of MACE or cardiac death.[13] The troponin test had not been established in the early 1980s when Wellens syndrome was described, so it was classically described in patients with unstable angina. Logically, nowadays many of these patients are diagnosed with NSTEMI.

Transthoracic echocardiography assessment of systolic and diastolic function, and regional wall motion abnormalities, increase the diagnostic efficacy, especially in early ACS presentations when the patient presents asymptomatic and/or with normal troponins.[14] In this patient, the initial echocardiogram reported hypokinesis in the anterior wall, which supported the diagnosis and contributed to the urgent invasive strategy.

Is well known the physiologic, technical, and clinical limitation of the conventional echocardiogram in the left ventricle function assessment. Strain imaging echocardiography has expanded in the diagnosis and prognosis of patients with ACS. GLS is very useful to identify early subclinical left ventricular dysfunction in the setting of preserved or mildly impaired systolic functional parameters. Regional deformation and strain curve morphology can help differentiate between normal, ischemic, and infarcted myocardium. GLS also predicts myocardial viability and assesses recovery of segmental and global left ventricular function.[15,16,17] The GLS in this patient was reduced in the acute phase in contrast to the normal LVEF. At seven days GLS improved greatly as well as the regional deformation, which brings good prognostic indicators.

CONCLUSION

It is to be expected that a proximal LAD stenosis or acute occlusion involves a large area of the myocardium. Rapidly identifying patients with Wellens syndrome is crucial to immediate intervention. The echocardiogram plays a valuable role in both diagnosis and follow-up.

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