

Case Report

Subtle de Winter in a 40 Years Old Male with No Chest Pain

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Abstract: BACKGROUND: It is well known that the Electrocardiogram (ECG) is the first and most important test to diagnose patients with acute coronary syndrome (ACS). ST elevations on ECG in a patient presenting with chest pain is defined as ST elevation myocardial infarction (STEMI) and is confirmed by cardiac catheterization. Various STEMI equivalents have been reported in the literature. Most STEMI equivalents are often missed or not recognized by physicians. So, giving attention to these presentations are very important for physicians and cardiologist. The de Winter ECG pattern is one of the rare STEMI equivalents presentations which deserves emergent reperfusion therapy. CASE REPORT: This case report describes a very subtle ECG pattern which found to have critical occlusion of the proximal left anterior descending (LAD) artery in a previously healthy 40-year-old patient who presented to the Emergency Department (ED) with no chest pain. The patient did not have any risk factors for ACS and was not taking any medication. The initial ECG showed mild ST depression, which was changed to biphasic T wave later on. Recognizing this specific ECG pattern is important to direct patients toward appropriate management early and prevent delay in diagnoses.

Keywords: Acute Myocardial Infarction (AMI), Anterior Wall Acute Myocardial Infarction, Left Anterior Descending Artery (LAD) Occlusion, de Winter Sign, STEMI-Equivalent, Acute Coronary Syndrome (ACS), Primary Percutaneous Coronary Intervention (PCI), Revascularization

1. Background

Electrocardiogram (ECG) is usually the first and most important test in patients with acute coronary syndrome. It helps in diagnosis and in classifying patients into ST elevation or non-ST elevation myocardial infarction (STEMI). The morbidity and mortality associated with ST-elevation myocardial infarction (STEMI) have been dramatically reduced after the introduction of reperfusion therapy with either fibrinolysis or percutaneous coronary intervention (PCI). However, patients occasionally present without obvious ST elevation on ECG, resulting in delayed diagnosis and reperfusion therapy.

Almost 10 years ago de Winter et al. reported an ECG pattern that is found in about 2% (30 of 1532) of patients with proximal left anterior descending artery occlusion (acute anterior myocardial infarction) and is often unrecognized by physician.[1] De Winter syndrome is characterized by ST depression and peaked T waves in precordial leads. Some

authors consider this pattern to be an equivalent of anterior STEMI. [1] This is a case of acute left anterior descending (LAD) artery occlusion presenting without obvious ST elevation in ECG but with features mimicking non-ST elevation acute coronary syndrome.

2. Case Report

This is a case of a de Winter ECG pattern in a healthy 49-year-old man with no prior medications and no risk factors for acute coronary syndrome. He presented to the ED with left shoulder pain for 4 days, pain localized to left shoulder only, no aggravating or relieving factors, no radiation, no SOB, no chest pain, no nausea or vomiting and No dyspnea. There was no family history of cardiac disease. The first electrocardiograms (ECG), performed at presentation revealed up-sloping ST-segment depressions < 1 mm in leads V₄₋₆ at the J point (Figure 1).

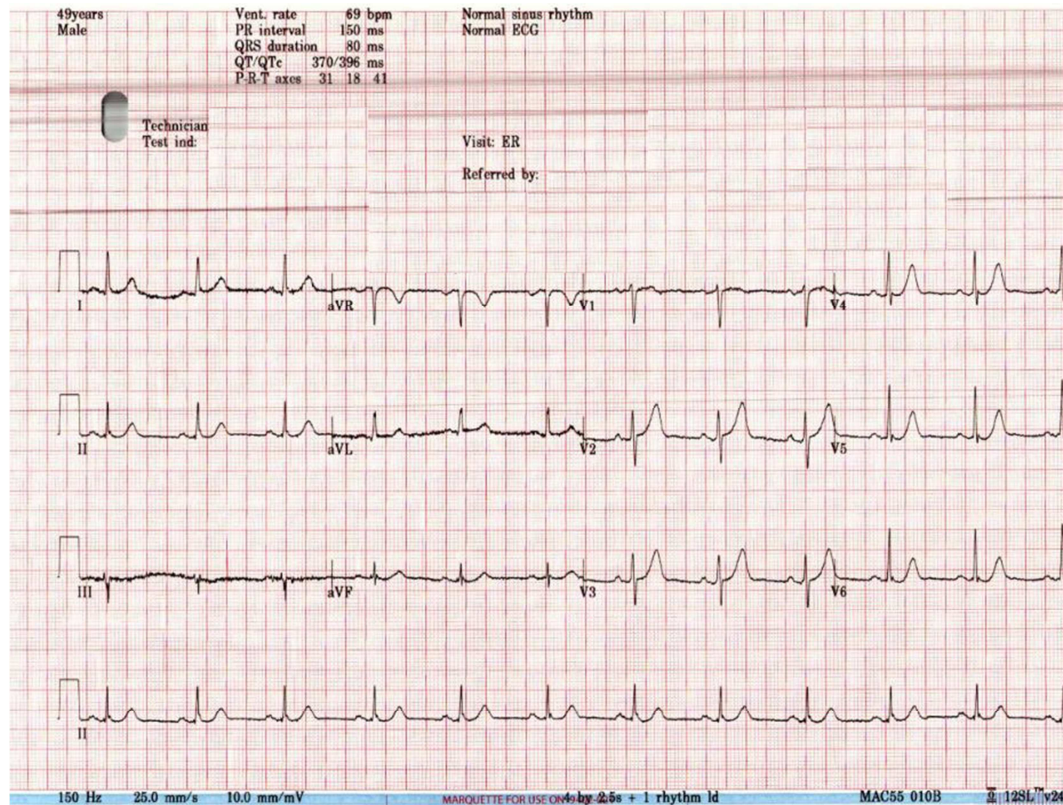


Figure 1. The 12-lead electrocardiogram (ECG) taken at the time of first presentation to the emergency department showing Subtle ST-segment depression in leads V4 – V6.

These changes were suspicious compared to the patient's baseline ECG (Figure 2).

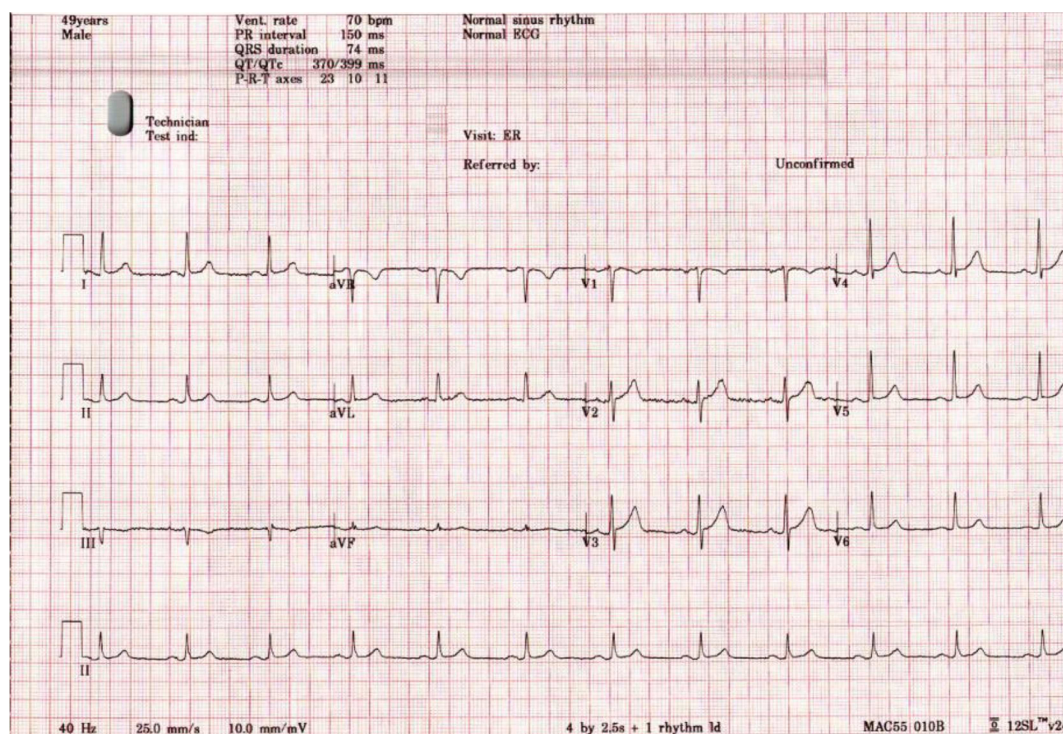


Figure 2. Baseline Normal ECG.

A later ECG revealed a biphasic T wave V2-V5 (Wellen's pattern, Figure 3), and the patient did not complain of any symptoms.

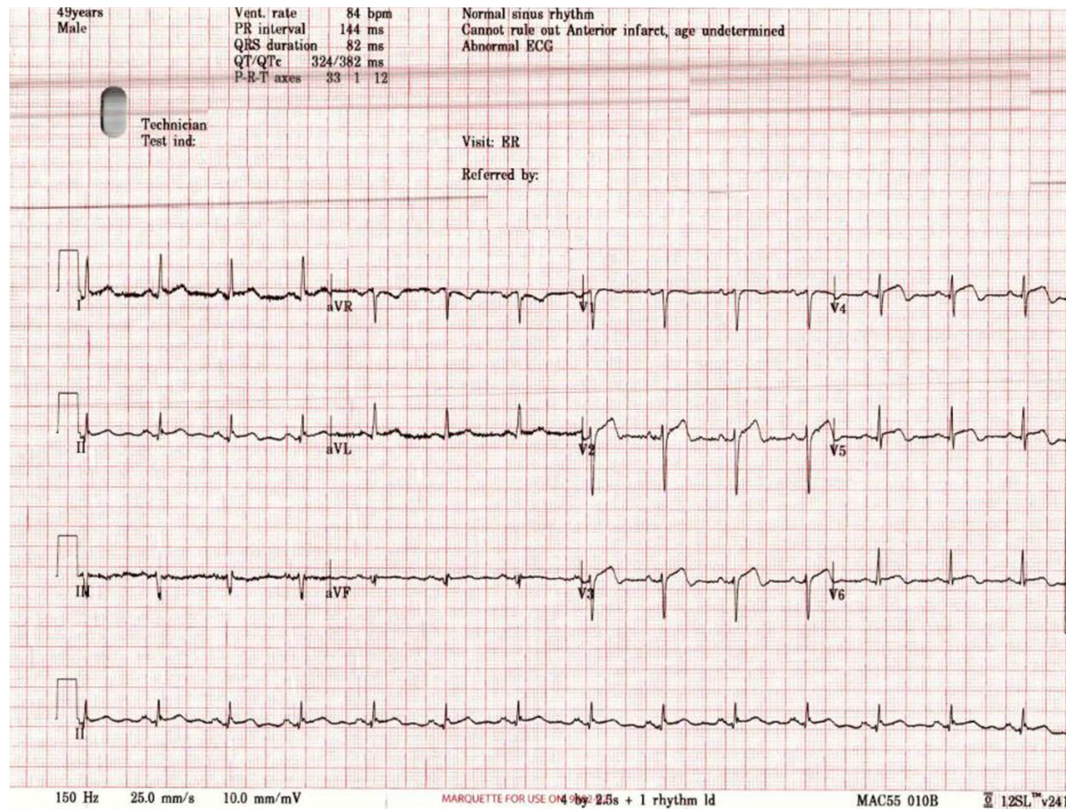


Figure 3. The 12-lead ECG taken at a later time in the emergency department revealing Wellens' sign, Biphasic T wave pattern in leads V3 – V6.

Troponin I level was 15.551 $\mu\text{g/L}$ (normal values $<0.1 \mu\text{g/L}$). The patient was transferred to the cardiac center for urgent cardiac catheterization, which found LAD occlusion (Figures 4, 5 & 6).

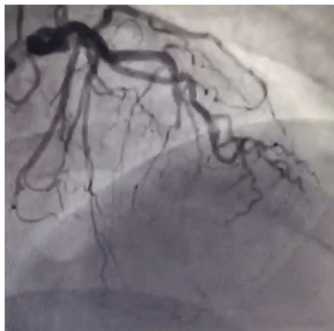


Figure 4. A coronary angiogram revealing left anterior descending (LAD) coronary artery occlusion.

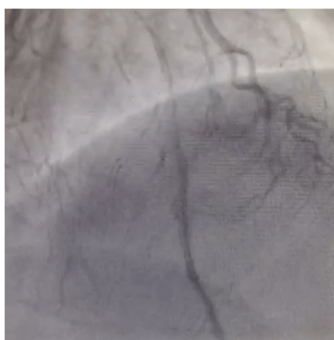


Figure 5. Percutaneous coronary intervention of the LAD coronary artery.

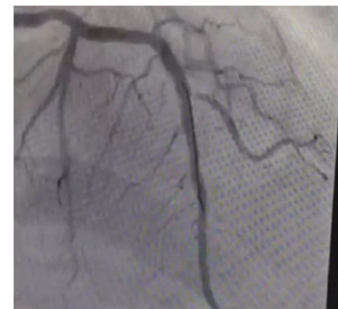


Figure 6. Blood flow was restored after percutaneous coronary intervention of the LAD coronary artery.

3. Discussion

In the proper clinical context, ST-segment elevation (measured at the J-point) is considered to be suggestive of ongoing coronary artery acute occlusion in the following cases: at least two contiguous leads with ST-segment elevation $\geq 2.5 \text{ mm}$ in men < 40 years, $\geq 2 \text{ mm}$ in men ≥ 40 years, or $\geq 1.5 \text{ mm}$ in women in leads V₂–V₃ and/or $\geq 1 \text{ mm}$ in the other leads [in the absence of left ventricular (LV) hypertrophy or left bundle branch block LBBB)]. [2] In a 2012 subanalysis of the HORIZONS-AMI database, a “semi-STEMI” was defined as maximal STE of 0.7 mm - 0.9 mm. [3] Another study found an 18% prevalence of “subtle” STE (0.1 mm - 1.0 mm), with an 86% rate of acute coronary artery occlusion. [4]

A de Winter sign is generally associated with occlusions in the proximal segment of the LAD and is not mentioned among

the ECG patterns representing acute left main coronary artery (LMCA) occlusion. [1], [5] It is a distinct form of anterior ST-segment elevation myocardial infarction (STEMI)-equivalent and is characterized by a unique ECG pattern. [1, 6] In 2010, Rokos *et al.* recognized de Winter pattern as a STEMI equivalent. [7]

The key diagnostic features of the ECG pattern include an upsloping ST-segment depression > 1 mm at the J point in the precordial leads; tall, prominent, and symmetrically peaked T waves with no classic ST-segment elevation in the precordial leads; and slight ST-segment elevation (0.5 - 1 mm) in the aVR lead. [8-10]

Various factors, such as individual differences in coronary anatomy, recruitment of collateral channels and repeated episodes of ischemia with preconditioning, the size of the jeopardized myocardium, timing of the ECG recording, partial obstruction causing some residual flow and different phases of the thrombotic cascade, may all be responsible for the various types of ECG changes. The American College of Cardiology (ACC) / American Heart Association (AHA) released non-STEMI guidelines in 2012 and STEMI guidelines in 2013, and neither mention de Winter ECG signs. [11] Further, the 2017 Guidelines of the European Society of Cardiology (ESC) do not mention the de Winter sign. [12] Whether de Winter T-wave ECG pattern can evolve into STEMI is debatable, and there are arguments that de Winter T-wave pattern is a part of STEMI evolution which was impeded with aggressive antithrombotic/antiplatelet therapy. [13] Zhao *et al.* suggested that patients showing the de Winter ECG pattern should receive follow-up treatment in accordance with the STEMI guidelines. [14] Thus, it is not a widely recognized type of acute myocardial infarction. Coronary angiography shows that the de Winter ECG sign is a manifestation of complete/partial LAD occlusion. Significance of this pattern lies in that failure to recognize these ECG changes may often lead to undertreatment. [15] Therefore, upon identifying the de Winter ECG, PCI should be performed immediately.

4. Conclusion

The characteristic ECG changes of the de Winter ECG pattern may be missed or misdiagnosed as nonspecific. To avoid missing a critical LAD lesion, physicians, paramedics and others involved in the triage of patients should be careful of subtle ECG changes because the classic diagnostic criteria (ST-segment depression >1 mm with upsloping ST-segments and tall, symmetrical T-waves in the precordial leads of the 12-lead ECG) are not always present. Such patients need urgent reperfusion therapy.

Consent

Approved waiver informed consent.

Ethical Approval

It is not applicable.

Conflict of Interest

The author declares no conflict of interest.

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