

Total Occlusion of Anterior Descending Artery (AD) without ST-Segment Elevation: DE Winter Pattern

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Abstract: The recognition of the presence of ST-segment elevation in the context of ACS (acute coronary syndrome) is fundamental for the good outcome of the case. However, some electrocardiographic patterns have been highlighted by the fact that there is no elevation, but they represent a severity similar to ACS with ST elevation. Hence, it is necessary that doctors who do the first service recognize these standards promptly. The electrocardiographic pattern of association between the ST-segment depression and the hyperacute T waves representing myocardial infarction in the anterior wall, localizing more specifically in the anterior descending artery, now known as the De Winter pattern, was first described by Dressler, and then described by Winter six years later. Winter observed that, out of a series of 1,452 cases, 2% of patients with anterior wall infarction had the pattern of ST-segment depression, positive and symmetrical T waves, and occasionally mild ST-segment elevation at AVR derivation. Those patients are admitted to the emergency room with a typical chest pain. However, because the electrocardiographic findings of this syndrome are not known to many health professionals, in many cases the patients do not receive adequate care and have fatal outcome, since mortality is relevant in these cases. Thus, the rapid recognition of this pattern is extremely necessary for the correct and effective intervention.

Key words: Electrocardiography, infarction, cardiac catheterization, cardiology.

1. Introduction

The recognition of the presence of ST-segment elevation in the context of ACS (acute coronary syndrome) is fundamental for the correct clinical and interventional management of cases of typical chest pain in the emergency department. However, some electrocardiographic patterns have been highlighted by the fact that there is no elevation, such as the De Winter pattern. This pattern on the ECG (electrocardiogram) is an equivalent of infarction in the anterior wall with ST-segment elevation, characterized by ST-segment depression and T-waves apiculated in precordial leads. Thus, it is necessary that those who provide the first service to such patients recognize these standards promptly, since mortality is increasing and quite relevant. The present article deals with the case report

of a patient assisted in the emergency room of a tertiary hospital with suspicion of typical chest pain and ECG without ST-segment elevation, but with total occlusion of the epicardial artery [1, 2].

2. Case Report

A 47-year-old male patient, previously healthy, sought emergency medical care with clinical complaints of typical chest pain started a few minutes ago while practicing physical activity. The electrocardiogram of the emergency department did not show signs of ACS with ST elevation, but it called for attention to the presence of ST-segment depression from V3 to V5 precordial leads, with the presence of broad, apical and symmetrical T waves, as well as ST-segment elevation at AVR derivation, compatible with the “de Winter” standard (Fig. 1). The patient was immediately taken to the hemodynamics room for coronary angiography (Fig. 2), diagnosed with total

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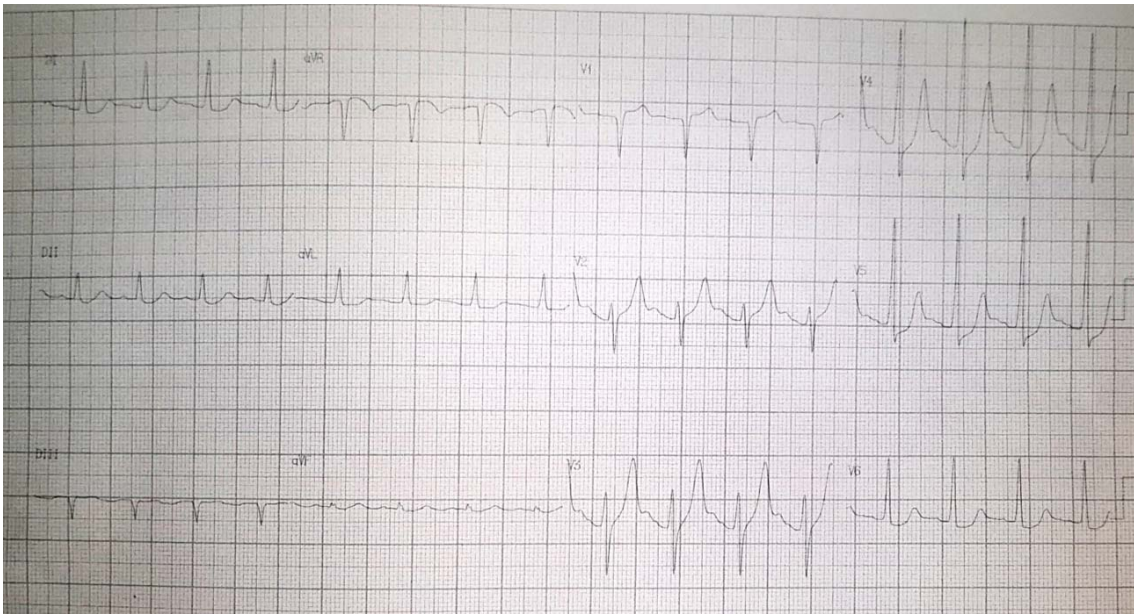


Fig. 1 ECG showing De Winter pattern.



Fig. 2 Coronary angiography showing total occlusion of the anterior descending artery.

occlusion of the left anterior descending artery (AD). After this diagnosis, the patient was treated through percutaneous primary angioplasty performed without intercurrences. This way, the patient could come back home and have consults in the ambulatory of the hospital to adjust the clinical treatment, without complications of the surgery treatment that was made.

3. Discussion

In this context, our case shows a typical case of Winter Pattern of ECG that appears in the emergency room and should be diagnosed as soon as possible to help the patient. This way, we will show what is most related in the medical literature about this situation.

Classically, localized ST-segment elevations have been the best and fastest way to diagnose myocardial ischemia. However, some patients develop certain electrocardiographic patterns with no ST elevation, but with severe lesions equivalent to ST elevation myocardial infarction, such as the de Winter pattern [3, 4].

This is characterized by ST depression and T wave apical and symmetrical from V1 to V5 leads, associated or not with ST elevation at AVR, denoting total occlusion of the anterior descending artery. The recognition of this electrocardiographic pattern is fundamental, since many of these patients are classified as coronary syndrome without ST elevation delaying immediate primary reperfusion [5].

For many years, the easiest and fastest approach to the diagnosis of ACS has been the ECG. That examination is useful because it allows not only observing classic patterns of ischemia and arrhythmias, for example, but also enabling the professional to locate the lesion in the artery or segment affected by the suspected injury. In the context of ACS, the most classically disseminated standard for recognition is ACS with ST-segment elevation. However, other conditions such as non-elevated ACS, unstable angina, and electrocardiographic equivalents with elevation

should be remembered and evaluated in the first analysis of the ECG before the patient with typical pain in the emergency room [4].

This electrocardiographic pattern, described in 2008 by Winter and Wellens, shows a very serious but difficult to recognize clinical situation, being present in up to 2% of the cases of total obstruction of the anterior descending artery and being considered an equivalent of ACS with elevation of anterior wall without the presence of classic ST-segment elevation.

In the context of ACS, it is worth noting that the patient often presents an atypical electrocardiographic pattern, without a clear ST-segment elevation, but presents equivalents of that elevation. For example, many patients have extensive involvement of the epicardial arteries but, on the ECG, they do not have STEMI (ST-Elevation Myocardial Infarction). Therefore, several patterns of equivalence are currently being described, among them is the De Winter pattern, which should be conducted with the same urgency as an ACS in the emergency room [6].

The De Winter pattern, which is considered a sign of proximal occlusion of the anterior descending coronary artery, is characterized by: ST-segment depression at the point J > 1 mm in the precordial leads (V1 to V6); high and symmetrical T waves; ST-segment elevation from 0.5 mm to 2 mm in AVR derivation. The high and symmetrical T waves appear to be a temporary finding and that precedes the ST-segment depression of the pre-cordials [6].

The physiological explanation for this phenomenon remains uncertain, but there are two main justifications. The first one is that there is an idiopathic anatomical variant of the Purkinje fibers, leading to delayed endocardial conduction. The second one is that the absence of ST-segment elevation is due to delayed activation of potassium channels in the sarcolemma because of acute ischemia with depletion of thiphosphate of adenosine stocks, this way, the repolarization is affected and results in this pattern of ECG [3].

In relation to the STEMI equivalent standards, in addition to the De Winter pattern, we can highlight: the first diagonal branch of the left anterior descending artery, characterized by ST-segment elevation in AVL derivation, symmetrical T-wave in V2 and AVL, and ST-segment depression with inverted T wave in D III and AVF derivation; occlusion of the left coronary artery, with ST elevation in AVR and/or rapid ST-segment depression in other derivations; Wellens syndrome, with T waves inverted or biphasic from V1 to V4; posterior wall infarction, with ST depression of V1-V3, prominent R from V1 to V2 and T wave high from V1 to V3 [7].

Patients with ACS should be admitted to centers that offer both options of treatment: clinical with thrombolytic and mechanical through coronary angiography and stenting. In this regard, the immediate recognition of equivalent standards by health professionals is of extreme relevance, since the severity and mortality of the lesions are increasing every minute after the arterial occlusion [7].

Currently, this pattern strongly suggests the acute proximal occlusion of the anterior descending artery, and should be considered as an equivalent of the ST-segment elevation myocardial infarction. It is worth noting that this pattern was only observed in the occlusion of this particular artery, being absent in the circumflex and right coronary lesions, for example. There is controversy in the literature regarding the duration of that pattern, as some authors consider it to be temporary and others as durable, but regardless of duration, the severity of the case is considerable and should be conducted correctly as an emergency [7].

Classically, pain referred by the patient begins about 90 minutes after total occlusion of this artery, only ceasing after reperfusion therapies.

Such patients should be conveyed as ACS carriers through immediate reperfusion through thrombolysis or percutaneous angiography. Primary percutaneous angioplasty is the treatment of choice in these cases and has a direct impact on mortality in these patients [2, 8].

The delay in recognizing this pattern leads to delays in the definitive treatment of these patients, increasing the chances of high morbimortality and future clinical repercussions of high severity, such as cardiogenic shock and heart failure [7].

4. Conclusions

The early recognition of this pattern by health professionals who work directly with cardiac emergencies is extremely relevant to the management of these patients, with a direct impact not only on mortality, but also on the morbidity of these patients. Thus, it is extremely important to recognize that pattern and to make the correct clinical management of the case in order to optimize the time until the arrival of primary coronary reperfusion.

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