

# The under-recognized value of an electrocardiogram

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In ST elevation myocardial infarction, an emergent coronary revascularization is recommended. Although, despite the recommendations not all the patients receive a standard therapy, due the presence of electrocardiogram (EKG) patterns that do not mimic a ST elevation. A 64-year-old male, smoker, was admitted for acute retrosternal pain, radiating to the jaw, associated with nausea and diaphoresis. EKG without a clear ST elevation but revealed a De Winter pattern. Transthoracic echocardiography showed hypokinesis in the mid and apical segments of the anterior wall, with preserved left ventricular ejection fraction. A coronary angiogram revealed a left anterior descending artery stenosis. After percutaneous coronary revascularization, there was clinical improvement, without other complications. De Winter pattern on the electrocardiogram is extremely predictive of acute left anterior descending coronary artery stenosis/occlusion. We highlight the importance of its interpretation as a STEMI equivalent and its indication to emergent reperfusion therapy.

**Key words:** STEMI, left anterior descending coronary artery, de Winter pattern.

## Nedoceněný význam elektrokardiogramu

V případě infarktu myokardu s elevacemi úseku ST je doporučena emergentní koronární revaskularizace. Ovšem ne všichni pacienti obdrží standardní léčbu, v některých případech je to z toho důvodu, že existují EKG obrazy, které nenapodobují elevaci úseku ST. Šedesátitýřletý muž, kuřák, byl přijat do nemocnice kvůli akutní retrosternální bolesti vyzařující do čelisti, spojené s nevolnostmi a pocením. Vyšetření EKG neprokázalo zřetelnou elevaci úseku ST, ale odhalilo de Winterův obraz. Transtorakální echokardiografie ukázala hypokinezi střední a apikální části přední stěny se zachovanou ejekční frakcí levé komory. Koronarografie odhalila stenózu ramus interventricularis anterior. Po urgentní perkutánní koronární intervenci došlo ke klinickému zlepšení bez jakýchkoli jiných komplikací. Charakteristický EKG obraz označovaný jako de Winterův je vysoce prediktivní stran akutního uzávěru/stenózy ramus interventricularis anterior. Zdůrazňujeme význam jeho interpretace jako ekvivalentu STEMI s nutností následné emergentní perfuzní léčby.

**Klíčová slova:** STEMI, ramus interventricularis anterior, de Winterův obraz.

## Introduction

In patients with suspected acute coronary syndrome, an electrocardiogram (EKG) should be the first exam to be done and, in case of ST elevation myocardial infarction (STEMI), an emergent coronary revascularization is mandatory. However, a dramatic number of patients with acute coronary occlusion do not receive a standard therapy (1), because in some cases there is not a clear ST elevation. The De Winter EKG pattern was descri-

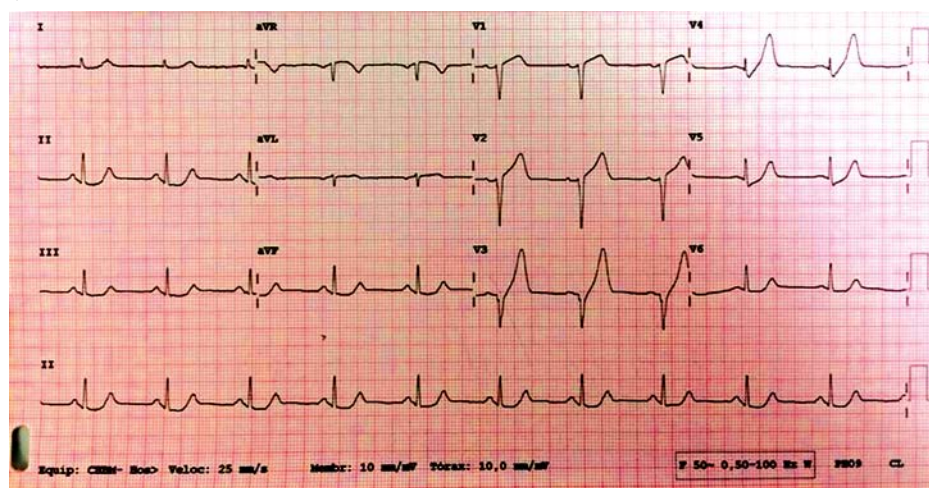
bed for the first time in 2008 (2), as a case series of patients who presented a left anterior descending (LAD) coronary artery occlusion without an ST elevation on the EKG. After several reports, the EKG pattern and its relationship with a LAD occlusion was described and established (3, 4).

## Case presentation

The authors report a clinical case of a 64-year-old male, current smoker of approxima-

tely 30 pack-years. He presented to the emergency department with complaints of acute retrosternal pain that had started five hours previously, radiating to the jaw and associated with nausea and diaphoresis. An immediate electrocardiogram was performed showing a sinus rhythm at 63 bpm, with a 0.5 mm ST elevation in aVR, 0.5–1.5 mm ST depression in the inferior leads, and an upsloping ST depression in V3–V4 that continued into wide, tall and symmetric T waves on

**Fig. 1.** The patient's 12-lead electrocardiogram at presentation shows sinus rhythm, with a 0.5 mm ST elevation in aVR, 0.5–1.5 mm and an upsloping ST depression in V3–V4 that continues into wide, tall and symmetric T waves on V2–V5, compatible with De Winter pattern



V2–V5. Transthoracic echocardiography showed hypokinesis in the mid and apical segments of the anterior wall, with preserved left ventricular ejection fraction. The patient was immediately submitted to coronary angiography that revealed, as expected for the EKG pattern, a 95% stenosis of the middle LAD artery. Percutaneous coronary intervention was performed with implantation of a drug-eluting stent. EKG evolution, at 72 hours, showed a sinus rhythm and T wave changes, with a new T wave inversion in leads V1–V4. During the hospitalization the patient was started on therapy for acute coronary syndrome and smoking cessation counseling protocol, and was discharged five days later without any complication registered.

## Discussion

The De Winter pattern generally presents the following characteristics on EKG: I) upsloping ST segment depression > 1 mm at the J-point in

the precordial leads; II) absence of ST elevation in the precordial leads; III) ST segment elevation of 0.5 mm to 1 mm in aVR; IV) tall, prominent, symmetric T waves in the precordial leads; and V) the ST segment elevation morphology can follow or, in some cases, precede the Winter pattern.

In the recent years, several reports describing the De Winter EKG pattern have verified its extremely predictive value to identify an acute LAD occlusion, highlighting the importance of its interpretation as a STEMI equivalent, with consequent emergent reperfusion therapy (3, 4), Morris NP, et al (5) published a systematic review in 2017 that concluded that the De Winter pattern on the EKG had a 95.2–100% positive predictive value for occlusion of the LAD artery. Generally, patients with this pattern present a higher incidence of hypercholesterolemia, are younger, and can represent up to 2% of LAD occlusion cases.

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The EKG tracing is similar in several aspects to hyperkalemia EKG, particularly because the T wave morphology is tall and symmetric as the De Winter pattern. Nevertheless, if carefully analyzed and considering the other characteristics (described before) as well the patient's symptoms suggesting an acute coronary syndrome it was possible to identify the STEMI.

## Conclusion

The authors present a clinical case of a patient with chest pain, absence of ST elevation on the EKG, but with a De Winter pattern that presented an acute middle LAD artery stenosis. Physicians should be alert for EKG patterns that mimic a STEMI to perform an emergent reperfusion therapy that will result in a favorable prognosis both in the short and long term. This pattern is not well described in the guidelines for acute coronary syndrome; nonetheless, considering the case reports previously described, the recommendations should reflect this pattern as a STEMI presentation, being extremely important for the physician to be able to recognize as well as treat it.

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