Wellens' Syndrome or Inverted U-waves?

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ABSTRACT

This report describes an example of a patient with chest pain and classic electrocardiographic changes consistent with ischemia in the proximal left anterior descending coronary artery (LAD) territory. This electrocardiogram (ECG) abnormality is known as Wellens' syndrome. However, the same abnormality is also described as inverted U-waves. The significance of this abnormality and the controversy of describing this syndrome is reviewed and discussed.

Key words: Wellens' syndrome, inverted U-wave, left anterior descending artery ischemia, left anterior descending ischemia, electrocardiogram

Case Report

A 46-year-old Asian male with a history of chest pain on exertion presented to the emergency room with resting chest pain. He remained pain free after treatment with sublingual nitroglycerin and had negative serial enzymes. However, his electrocardiogram (ECG) showed terminally inverted T-waves in V2 and V3 (Figure 1) consistent with the so-called Wellens' syndrome or Inverted U-wave. He underwent coronary angiography, which revealed 95% proximal left anterior descending artery occlusion involving the first and second diagonal arteries. The patient underwent successful coronary bypass surgery with resolution of his symptoms.

Discussion

In 1979, Gerson and colleagues first described the occurrence of exercise-induced inverted terminal T-waves in the precordial leads in patients with proximal left anterior descending artery (LAD) ischemia.¹ They named it exercise-induced U-wave inversion despite the fact that this ECG abnormality appears to occur in the terminal portion of the T-waves. Thirty-three out of 36 patients (92%) with this abnormality had more than 75% stenosis in the proximal LAD. One year later, Gerson again described the occurrence of this abnormality, this time at rest, in patients with LAD or left main ischemia in 89% of cases.² Two years after Gerson's description of this ECG abnormality, De Zwaan, Wellen, and colleagues in 1982 reported similar ECG abnormality^{3–5} without mentioning inverted U-waves. They found that the patients who were admitted for unstable angina with this ECG finding were at high risk for myocardial infarction. Of 145 consecutive patients with unstable angina, 18% had this ECG pattern.

Despite aggressive therapy, 75% of patients without bypass surgery developed extensive anterior wall myocardial infarction within a few weeks. This ECG abnormality in the setting of LAD ischemia has been repeatedly recognized by numerous authors as Wellens' syndrome^{3–11} despite the fact that it was initially described by Dr. Gerson 2 years earlier. However, there are many other authors who describe this finding as inverted U-waves similar to the description that was introduced by Dr. Gerson in 1980.^{12–15} In contrast to Dr. Gerson's description, a careful observation of the ECG suggests terminal T-wave inversion. In fact, in Figure 1, one can see a U-wave after the terminally inverted T-wave in lead V2. The sequential changes of the ECG in the course of proximal LAD ischemia also speaks against the inverted U-wave theory. In this setting, usually, the patient presents with slight ST-elevation in the precordial leads with evolution to terminally inverted T-waves in leads V2–V4 after chest pain resolution. This is usually followed by complete T-wave inversion with or without QT prolongation in those leads later.

It is interesting to note that the available literature describes two different terminologies for the same ECG finding, and only mentions one or the other terminology in their manuscripts. In other words, none of the authors who describe this ECG finding as Wellens' syndrome mention any publications describing this finding as inverted U-waves in their reference list, and vice versa. There appears to be a general unawareness in the medical community about these two terminologies describing the same ECG abnormality. To avoid confusion, it is important that the medical community is made aware about this dual description of the same ECG finding.

Figure 1: Inverted terminal T-wave in V2 and V3 consistent with the so-called Wellens' syndrome or Inverted U-wave, highly specific for proximal left anterior descending artery stenosis.

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