

# Wellens' Syndrome

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## Abstract

Although the electrocardiographic (ECG) changes for Wellens' syndrome are easy to recognize, many cardiac care unit nurses and staff physicians may not be aware of their significance. Wellens' syndrome is a pattern of ECG T-wave changes associated with critical, proximal left anterior descending artery (LAD) lesion. Thus, it is vital that this finding gets recognized promptly. Classically, the ECG findings of Wellens' occur during the pain free period of angina. We present a clinical variation of Wellens', where the typical ECG findings manifested during the pain episode.

## CASE PRESENTATION

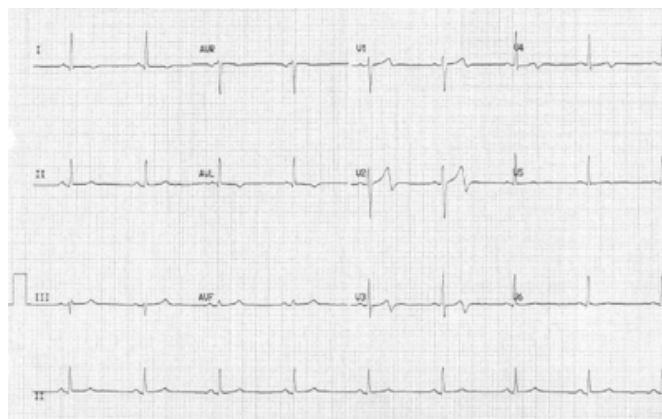
A 50-year-old Caucasian female presented to the emergency room (ER) with new onset of chest pain over the last 2 weeks. Her pain was retrosternal in location, radiating to the left arm, sharp in nature and intermittent lasting 10-15 minutes. The pain was not precipitated by exercise and its intensity was 10/10, which made the patient rush to the ER. Sublingual nitroglycerin promptly relieved the pain.

The patient had a medical history of hypertension for which she was taking lisinopril and hydrochlorothiazide. She also had chronic back pain for which she had undergone neck and shoulder surgery. The patient had a 40 pack-year history of smoking. Her mother suffered from myocardial infarction at age 59, and her father had prostate cancer.

The physical examination on admission was normal except for BP of 170/101. ECG performed upon arrival to the ER and while having chest pain revealed biphasic T-wave inversions in leads V1-2-3-4, with no R loss or q waves (Figure # 1). Cardiac enzymes were within normal limits. Follow-up ECG after pain relief with sublingual nitroglycerin did not show any change. These ECG findings were consistent with Wellens' syndrome, thus the patient was emergently transferred to the cardiac catheterization lab where she underwent coronary angiography. This showed single vessel coronary artery disease affecting the proximal portion of the left anterior descending coronary artery with a 95% stenotic lesion. In addition, the left ventricular ejection fraction was 45%, and the anterior wall was hypokinetic (Figure # 2). The patient underwent a successful transluminal coronary angioplasty with stent deployment.

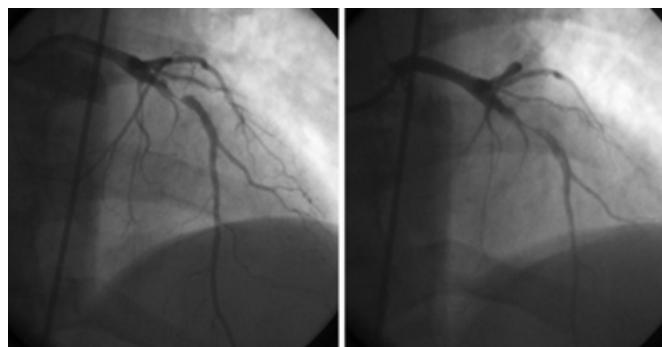
**Figure 1**

Figure 1



**Figure 2**

Figure 2



## DISCUSSION

Wellens' syndrome is a pattern of ECG T-wave changes associated with critical, proximal left anterior descending artery (LAD) lesion. Identification of Wellens' syndrome as these patients may be pain free at the time of the ECG

changes, yet they are at very high risk of developing myocardial infarction. In addition, planning an exercise stress test for these patients can be fatal due to the severe stenosis that might lead to infarction at the time of increased cardiac demand. <sup>1</sup>

Wellens' syndrome is not infrequent with a reported incidence of 10 to 15 percent in the United States <sup>2</sup>. In patients with this syndrome, the ECG is normal when done in periods with no chest pain, yet the T-wave abnormalities often appear after the disappearance of the chest pain. <sup>3</sup> In 1982 Wellens published his observation that a pattern of inverted T-wave in the precordial leads was strongly associated with early large anterior myocardial infarction and a poor prognosis in patients presenting with unstable angina. <sup>2</sup> He further demonstrated that most of these patients had severe stenosis of the proximal left anterior descending coronary artery and postulated that these patients would do better with early angiography and selective surgical treatment or angioplasty. Table # 1 shows the criteria for Wellens' syndrome. <sup>3,4</sup>

Figure 3

Table 1

Criteria of Wellens' syndrome
Prior history of chest pain
Chest pain with normal ECG
Normal or minimally elevated cardiac enzymes
No pathologic precordial Q waves or loss of R waves
ST segment in V2 and V3 that is isoelectric or minimally elevated (1mm), concave or straight
Symmetric and deep T-wave inversion or biphasic T-waves in V2 to V5 or V6 in pain free periods
Tight proximal LAD stenosis

The 2000 American College of Cardiology/American Heart Association guidelines for the management of patients with unstable angina pectoris include T-wave inversion greater than 0.2mV as a sign of ischemia. <sup>5</sup> However, in Wellens' syndrome the T-wave inversion despite of being nonspecific according these guidelines, in the right setting they are very predictive of a severe LAD lesion. Failure to diagnose Wellens' syndrome and thus not treating the underlying CAD can have a deleterious result. Typically, 75 % of these patients will develop anterior wall myocardial infarction, usually within a matter of days, even if they are treated with medical management. Consequently, early cardiac catheterization with subsequent angioplasty or coronary bypass surgery is now recommended for these patients. <sup>4</sup>

The key features of this electrocardiographic syndrome are the T-wave findings. These changes may present in one of

two patterns. In 75% of cases, the precordial T-waves are deeply inverted with symmetric contour. The less common variant, comprising 25% of cases presents with biphasic T-waves, as demonstrated in our case. Although in the classical cases of Wellens' syndrome the T-wave changes are evident only in pain-free periods and not during episodes of chest pain, our case represents a variation of Wellens' syndrome with the ECG changes persisting through the pain periods. Classically, in Wellens' syndrome, the inverted or biphasic T-waves are replaced during episodes of ischemia by positive T-waves with either ST-segment elevation or depression. <sup>6</sup> The origin of these T- wave changes remains unclear, but these changes can persist for months. After appropriate intervention these ECG abnormalities tend to normalize. <sup>6, 7</sup>

There are some case reports of Wellens' syndrome that do not conform to the description given earlier. Kardesoglu et al. reported a case in which the ECG pattern changed from type 2 to type 1 during observation, and the coronary angiography showed the LAD lesion in the middle part of the LAD rather than the proximal LAD. <sup>7</sup>

CONCLUSION

It is of great importance to recognize the ECG pattern of Wellens' syndrome and to manage the patient accordingly. Failure to do so may have deleterious outcome. Our case report demonstrates that the presentations of this syndrome may have some deviations from the traditional definition. Thus, the T-wave changes can be detected during the pain episode as well as during the pain-free periods. Wellens' syndrome is a pre-infarction stage of coronary artery disease; therefore, recognizing this syndrome could be a life-saving diagnosis.

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