



## CASE REPORT

## Unexpected Coronary Angiographic Findings in a Patient with Wellens' Sign

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### Keywords

Coronary angiography, Acute coronary syndrome, Atherosclerosis, Wellens' syndrome

### Abbreviations

ECG: Electrocardiogram; CCU: Cardiac Care Unit; LCx: Left Circumflex; RCA: Right Coronary Artery; LAD: Left Anterior Descending; PCI: Percutaneous Coronary Intervention

### Introduction

The abnormal electrocardiogram findings of Wellens' sign that occur in the context of unstable angina are typically associated with significant stenosis in the proximal left anterior descending (LAD) coronary artery. We report an unusual case of a patient who had unstable angina and Wellens' sign, without significant LAD stenosis.

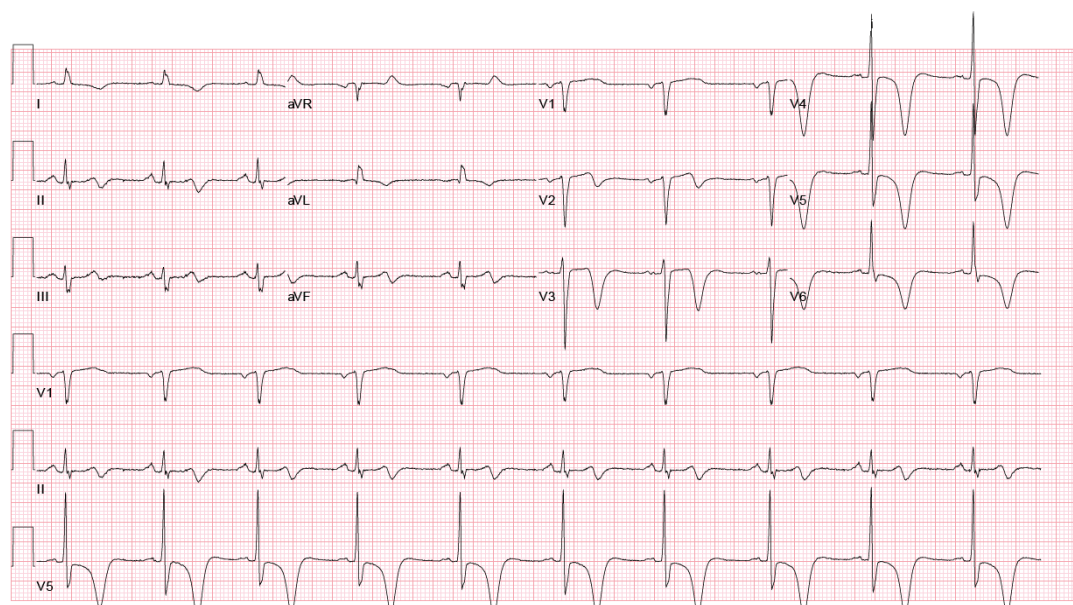
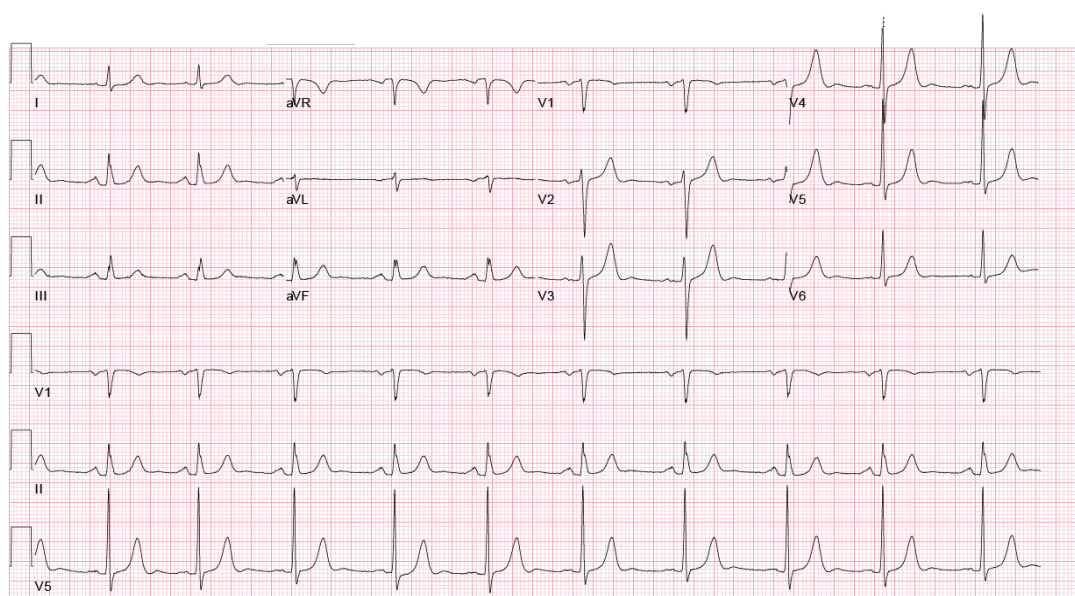


Figure 1: Presenting ECG showing biphasic T-waves in V2 and deep inverted T-waves in V3.

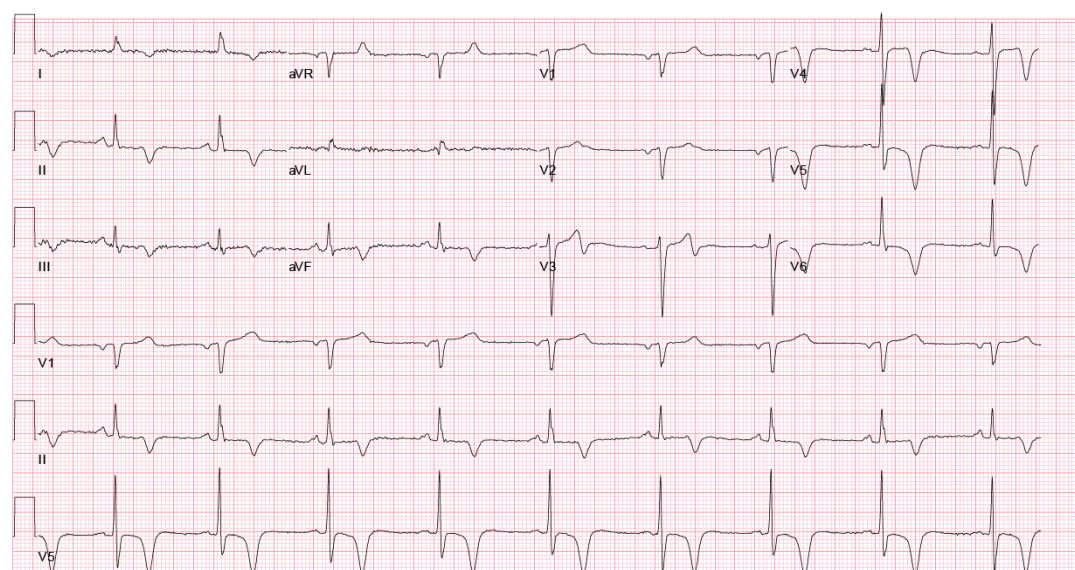
## Case Description

An 81-year-old man with moderate to severe aortic stenosis, hypertension, mild left ventricular hypertrophy, hyperlipidemia, and history of tobacco use presented to the emergency department with subacute-onset intermittent chest pressure at rest, decreased exercise tolerance, and occasional presyncope. At the time of presentation, he was free of symptoms, including chest pain. His blood pressure was 190/91 and he had a grade 3/6 systolic murmur best heard at the right sternal border of the 2<sup>nd</sup> intercostal space. His presenting electrocardiogram (ECG) showed biphasic T-waves in lead V<sub>2</sub> and deeply inverted T-waves in V<sub>3</sub> to V<sub>6</sub> (Figure 1). These were markedly different from his ECG two years earlier, when his T-waves were upright

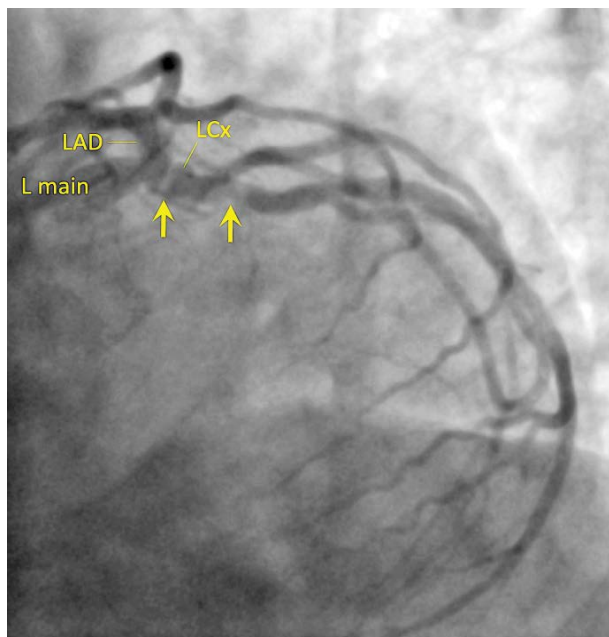
in these leads (Figure 2 and Figure 3). Serum troponin was negative. A transthoracic echocardiogram re-demonstrated known moderate to severe aortic stenosis and mild concentric left ventricular hypertrophy without evidence of apical hypertrophic cardiomyopathy. Given the concern for hypertensive emergency and unstable angina, he was admitted to the cardiac care unit (CCU), where his blood pressure was lowered with intravenous nitroglycerin and carvedilol, in addition to his outpatient medication, lisinopril. He was also started on other medications for acute coronary syndrome, including aspirin, intravenous heparin, and atorvastatin. The following day, coronary angiography was performed and revealed a 30% distal left main coronary artery stenosis, 95% ostial and 70% mid left circumflex (LCx) artery stenoses (Figure 4), and a 99%



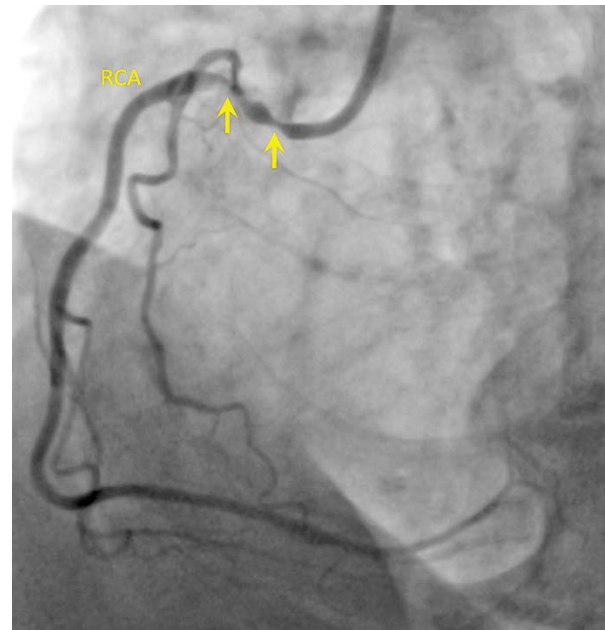
**Figure 2:** Baseline ECG showing upright T-waves in leads V<sub>2-6</sub>.



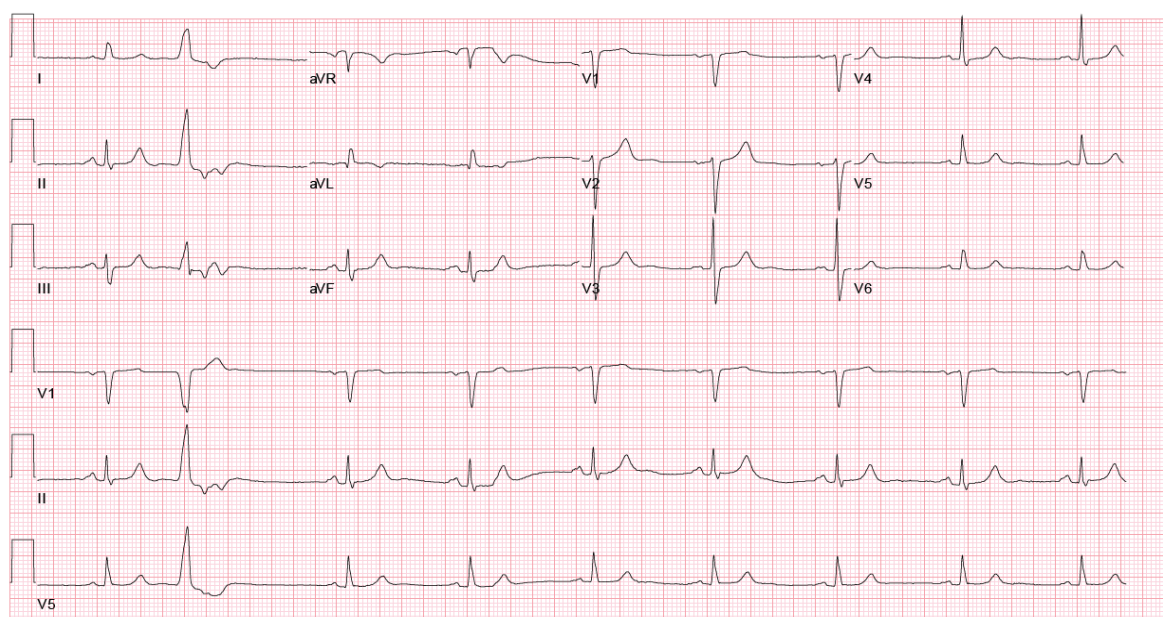
**Figure 3:** Follow-up ECG 10 day's post-PCI showing interval changes compared to presenting ECG; T-waves are now upright in V<sub>2</sub> and biphasic in V<sub>3</sub>, with persistent inversion in V<sub>4-6</sub>.



**Figure 4:** LAO-caudal (extreme “spider”) projection showing 95% eccentric, ostial and 70% mid left circumflex (LCx) artery stenoses.



**Figure 5:** LAO projection showing 90% ostial and 80% proximal right coronary artery (RCA) stenoses.



**Figure 6:** Follow-up ECG 4 month's post-PCI showing complete resolution of T-wave abnormalities in V<sub>2-6</sub>.

ostial right coronary artery (RCA) stenosis (Figure 5). The left anterior descending (LAD) artery had no significant stenosis. Left heart catheterization measurements showed an aortic valve area of 1.1 cm<sup>2</sup>. After careful consideration of percutaneous and surgical coronary revascularization strategies, the patient was deemed a more suitable candidate for percutaneous coronary intervention (PCI) and underwent successful PCI, with deployment of drug-eluting stents to the LCx and RCA. The T-wave abnormalities on ECG persisted at time of discharge, but the patient's symptoms improved significantly. The T-wave abnormalities ultimately resolved and returned to baseline on his 4 month follow up ECG (Figure 6).

## Conclusions

Wellens' sign refers to the abnormal ECG findings of deeply, symmetrically inverted or biphasic T-waves in the precordial leads in the context of unstable angina [1,2]. The T-wave abnormalities often appear after the chest pain has subsided and are not associated with ST-segment elevation, signs of an old anterior wall infarct (i.e., poor R-wave progression or Q-waves in the precordial leads), or serum troponin elevation. The dynamic nature of the T-waves is thought to reflect the waxing and waning of coronary flow during unstable angina. Similar T-wave abnormalities can be found in other conditions, such as an acute intracranial event

(e.g., subarachnoid hemorrhage), the apical variant of hypertrophic cardiomyopathy, and stress-induced cardiomyopathy. However, when they are present in the setting of unstable angina, the coronary stenosis is most often found in the proximal LAD [1,2]. This case adds to the small number of published reports describing Wellens' sign in unstable angina but in the absence of significant LAD stenosis [3]. The persistence of the ECG abnormalities for multiple days following PCI may reflect delayed resolution of repolarization abnormalities.

### Funding

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### Disclosures

None.

### References

1. de Zwaan C, Bär FW, Wellens HJ (1982) Characteristic electrocardiographic pattern indicating a critical stenosis high in left anterior descending coronary artery in patients admitted because of impending myocardial infarction. *Am Heart J* 103: 730-736.
2. de Zwaan C, Bär FW, Janssen JH, Cheriex EC, Dassen WR, et al. (1989) Angiographic and clinical characteristics of patients with unstable angina showing an ECG pattern indicating critical narrowing of the proximal LAD coronary artery. *Am Heart J* 117: 657-665.
3. Wang X, Sun J, Feng Z, Gao Y, Sun C, et al. (2018) Two case reports of Wellens' syndrome. *J Int Med Res* 46: 4845-4851.