

CLINICAL VIGNETTE

Predicting Acute Myocardial Infarction: An Unexpected Case of Wellens Syndrome

William K. Winter, MD

A 92-year-old man presented to the emergency department with increased urinary frequency. He had previously been evaluated by his primary care physician earlier that week, who ordered a urine culture that subsequently grew more than 100,000 colony forming units/mL of *escherichia coli* sensitive to most commonly used antibiotics. His outpatient testing included a basic metabolic panel, which was concerning for serum potassium of 6.1 mmol/L and an elevated creatinine. His PCP had empirically prescribed cefpodoxime for his urinary tract infection, but he had not yet picked up his medication at the time of presentation.

On presentation, his initial vitals included temperature of 38.4°C, blood pressure of 134/81, heart rate of 104 beats/minute, and oxygen saturation of 99% on room air. Physical examination revealed an elderly man lying in a hospital bed in no distress. His cardiovascular examination was unremarkable except for marked pitting edema in lateral lower extremities. The remainder of his examination of other systems was unremarkable. Given his hyperkalemia, EKG was interpreted as normal sinus rhythm with premature atrial contracts, first

degree atrioventricular block with inferolateral deep T-wave inversions (Figure 1). Even after correction of his hyperkalemia, repeat electrocardiograms continued to demonstrate inferolateral deep T-wave inversions (Figure 2). No prior electrocardiograms were available for review. Initial and subsequent troponin were negative.

Additional history was obtained. He denied any current or recent chest pain. He had been previously evaluated by a cardiologist at an outside hospital in the remote past and underwent functional cardiac imaging, but did not recall being informed about any cardiac abnormalities. His past medical history was notable for hypertension, which had been diagnosed twenty years before presentation. He is able to walk approximately 1 block without discomfort. Family history was unknown as the patient was adopted. He reported remote history of tobacco use and denied current or prior history of recreational drug use.

Cardiology was consulted given concern for his ischemic pattern of ST-T changes, which is also commonly known as Wellens' Syndrome.

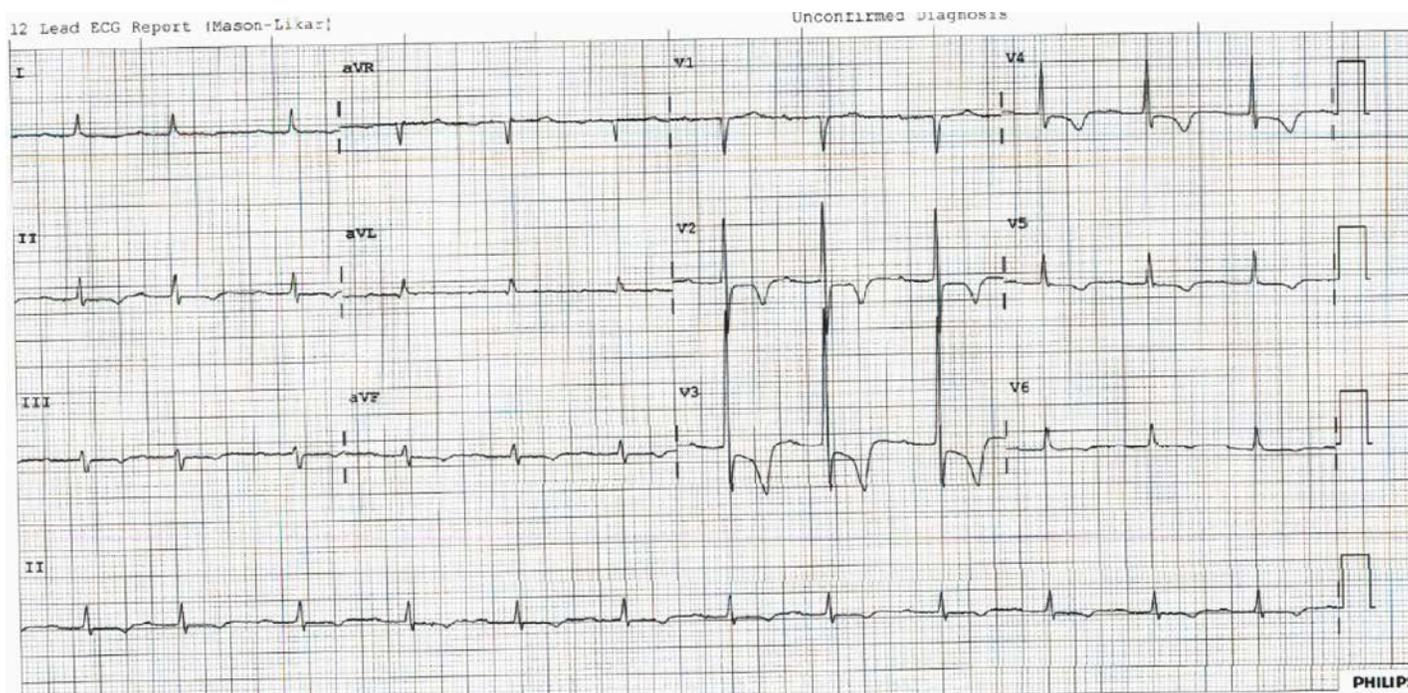


Figure 1: EKG on presentation

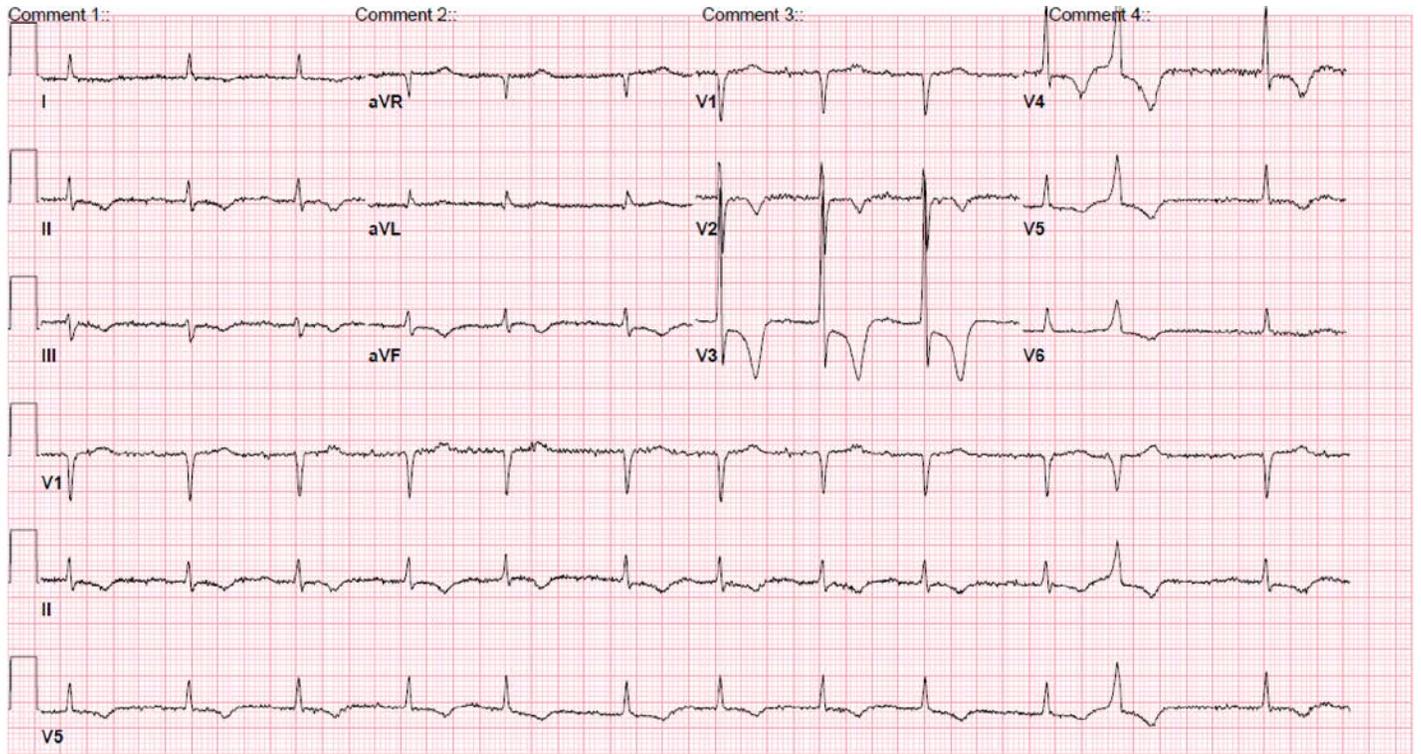


Figure 2: EKG obtained several hours after presentation

Discussion

Wellens' syndrome is a distinctive electrocardiographic pattern suggestive of critical stenosis of the left anterior descending (LAD) coronary artery. It was initially described in 1982 by Zwaan et al, who identified a subgroup of patients presenting with unstable angina who were at very high-risk of experiencing an acute myocardial infarction involving the anterior wall within hours to days of presentation. A hallmark of this subgroup was non-elevated (<1 mm) ST segment in leads V2 and V3 with a negative, symmetrically inverted T wave.¹ It was noted that other precordial leads, including V1 and V4, also show these abnormalities in some patients.

The currently accepted criteria for Wellens' syndrome include presence of biphasic T waves in leads V2-V3 ("type A" pattern) or symmetric, deeply inverted T waves in leads V2-V3 ("type B" pattern) and the following: prior history of angina; normal cardiac enzymes; absence of pathologic Q waves; isoelectric, or minimal (<1mm) elevation of ST segments; and no abnormalities in precordial R wave progression.²⁻⁴

The specificity of this syndrome in predicting LAD stenosis is remarkably high. In a follow-up study performed by Zwann et al, among 180 patients with the electrocardiographic findings who underwent cardiac catheterization, were all found to have at least 50% occlusion of the proximal left anterior descending artery.⁵ Nearly 20% had complete LAD occlusion.

Given the serious nature of this syndrome, physicians should obtain prompt Cardiology consultation and consider urgent cardiac catheterization

Our patient underwent transthoracic echocardiogram which was unremarkable and did not show any wall motion abnormalities. Per patient preference, cardiac catheterization was deferred. He subsequently underwent a nuclear stress test that was negative for scintigraphic evidence for stress-induced ischemia or prior myocardial infarction. He was subsequently discharged with close outpatient Cardiology follow-up.

REFERENCES

1. **de Zwaan C, Bär FW, Wellens HJ.** 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.* 1982 Apr;103(4 Pt 2):730-6. doi: 10.1016/0002-8703(82)90480-x. PMID: 6121481.
2. **Tandy TK, Bottomy DP, Lewis JG.** Wellens' syndrome. *Ann Emerg Med.* 1999 Mar;33(3):347-51. doi: 10.1016/s0196-0644(99)70373-2. PMID: 10036351.
3. **Rhinehardt J, Brady WJ, Perron AD, Mattu A.** Electrocardiographic manifestations of Wellens' syndrome. *Am J Emerg Med.* 2002 Nov;20(7):638-43. doi: 10.1053/ajem.2002.34800. PMID: 12442245.
4. **Al-Assaf O, Abdulghani M, Musa A, AlJallaf M.** Wellen's Syndrome: The Life-Threatening Diagnosis.

Circulation. 2019 Nov 26;140(22):1851-1852. doi: 10.1161/CIRCULATIONAHA.119.043780. Epub 2019 Nov 25. PMID: 31765255.

5. **de Zwaan C, Bär FW, Janssen JH, Cheriex EC, Dassen WR, Brugada P, Penn OC, Wellens HJ.** 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*. 1989 Mar;117(3):657-65. doi: 10.1016/0002-8703(89)90742-4. PMID: 2784024.