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Case report: Unexpected presentation of Wellens' syndrome in Public Health Centers

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ABSTRACT

Electrocardiography (ECG) is an essential tool for diagnosing and risk-stratifying acute coronary syndrome patients. Only 20% of acute ischemia ECG changes are recognized by emergency medical service (EMS) providers. Wellens' syndrome is an ECG characteristic, as certain ST-T segment abnormalities in the setting of impending myocardial infarction (MI) patients suggestively caused by critical stenosis in the proximal left anterior descending (LAD) artery. Myocardial infarction from a culprit lesion in the LAD artery is related to worse clinical outcomes. The first patient was a 27-year-old man smoker who presented with epigastric pain accompanied by shortness of breath in the past 1 hour. His blood pressure was 170/100 mmHg and physical examination revealed epigastric tenderness. ECG revealed biphasic T waves in leads V2-V5, suggestive of Wellens type A. The second patient was a 37-year-old man who presented after being stung by an insect 15 minutes before. Upon observation, the patient suddenly experienced left-sided chest pain accompanied by diaphoresis. ECG revealed inverted T waves in leads V2-V4, suggestive of Wellens type B. Further history-taking revealed that he had experienced this kind of symptoms three months prior and had a history of hypertension, dyslipidemia, and a current smoker. Unfortunately, both patients refused to be referred for further examination and management. Physicians and EMS providers should be aware of Wellen's syndrome. Misinterpretation of this ECG characteristic could lead to fatal outcomes. Educating patients thoroughly about their condition is also important.

Keywords: *Wellens syndrome; electrocardiogram; acute coronary syndrome; atypical presentation; public health center*

INTRODUCTION

Electrocardiography (ECG) is an essential tool for diagnosing and risk-stratifying acute coronary syndrome (ACS) patients.[1] In contrast to those with ST-segment elevation myocardial infarction (STEMI), noticing ECG changes in non-ST-segment elevation (NSTE) ACS is frequently more challenging. According to a study by Faramand et al.[2], only 20% of acute ischemia ECG changes are recognized by emergency medical service (EMS) providers and nearly half of those findings are regarded as benign. This misinterpretation leads to 30% undertriaged MI events by EMS providers.

Wellens' syndrome is an ECG characteristic that was first described by de Zwaan, et al.[3] in 1982 as certain ST-T segment abnormalities in the precordial leads in the setting of impending myocardial infarction (MI) patients. It is suggestively caused by critical stenosis in the proximal left anterior descending (LAD) artery. There are two main types of ECG changes in the right to mid-precordial leads: biphasic T waves, referred to as type A (24%), and isoelectric or minimally elevated straight or convex-shaped ST segments, followed by inverted T waves with 60° to 90° angles, referred to as type B (76%).[3,4] A later larger study by de Zwaan, et al.[5] reported that 14% of unstable angina patients exhibited the ECG characteristics of Wellens' syndrome, and all of those patients revealed ≥50% narrowing of the LAD according to coronary angiography. Myocardial infarction resulting from a culprit lesion in the LAD artery is related to widespread myocardial injury and worse clinical outcomes since it supplies a significant portion of the left ventricle.[1] Therefore, it is important for physicians and EMS providers to recognize and be aware of Wellens' syndrome ECG signs. In the current case series, we present two unexpected patient presentations with Wellens' syndrome from two public health centers in Nunukan Regency, North Kalimantan, Indonesia.

Case Reports

Case 1

A 27-year-old man presented at Nunukan Public Health Center with epigastric pain accompanied by shortness of breath in the past 1 hour. The patient was a current smoker and stated that he did not have any history of illness. It was his first time experiencing this kind of symptoms and denied prior eating spicy or sour food. His vital signs were blood pressure (BP)

170/100 mmHg, heart rate (HR) 83 beats per minute (bpm), respiratory rate (RR) 30 times per minute, and SpO_2 99% with room air. Physical examination revealed epigastric tenderness. ECG revealed a sinus rhythm, regular HR with 72 bpm, normal axis, normal PR interval, no pathological Q wave, normal QRS duration, normal R wave progression, normal ST-segment, and biphasic T waves in leads V2-V5, suggestive Wellens type A **(Figure 1)**. The patient was given 5 mg sublingual isosorbide dinitrate (ISDN), and eventually, his symptoms improved. Unfortunately, the patient refused to be referred to the hospital, and no further evaluation regarding his condition was performed.

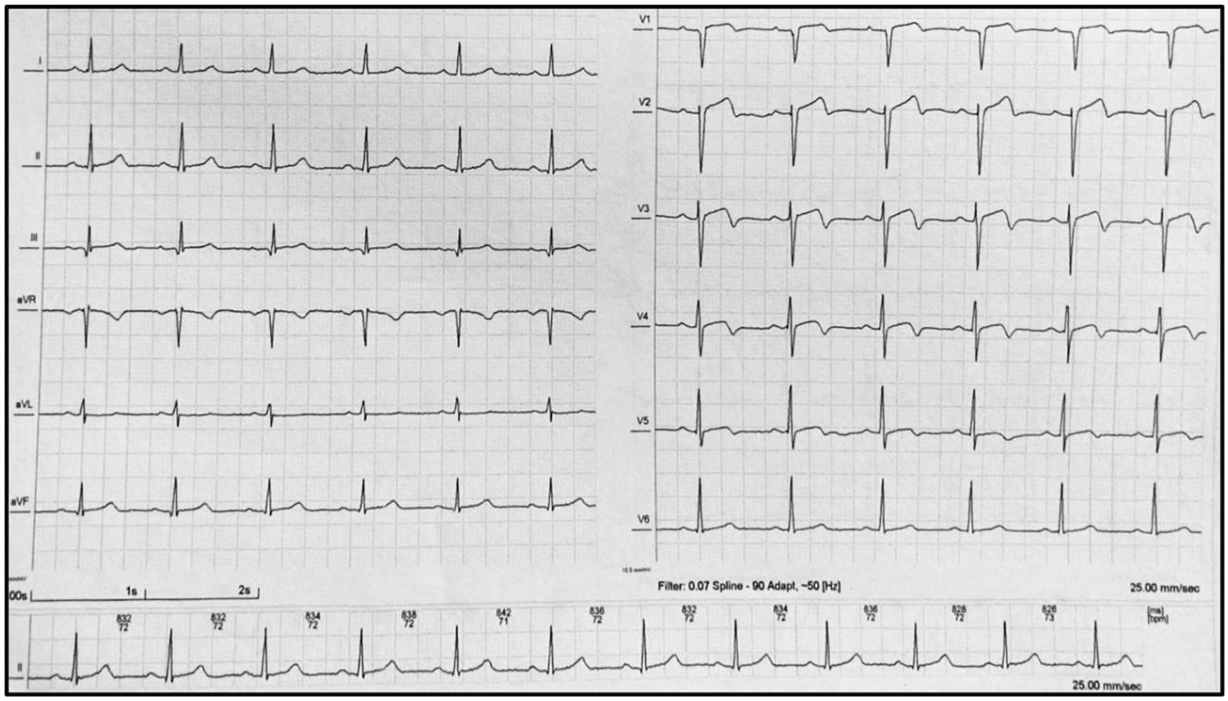

Figure 1. Biphasic T waves in leads V2-V5, suggestive Wellens type A.

Case 2

A 37-year-old man presented at Sedadap Public Health Center with an itchy sensation all over his body after being stung by an insect 15 minutes before. He denied any other symptoms, such as dizziness, breathing difficulty, swelling, indigestion symptoms, or rashes. His vital signs were BP 140/90 mmHg, HR 109 bpm, RR 20 tpm, and SpO_2 98% with room air. Physical examinations were within normal limits. Dexamethasone 5 mg was administered intravenously, and the patient was observed for 30 minutes. Upon observation, the patient suddenly

experienced left-sided chest pain without any radiation accompanied by diaphoresis. ECG was performed and revealed sinus rhythm with a heart rate of 70 bpm, normal axis, normal P wave morphology, normal PR interval, no pathological Q wave, normal QRS duration, normal R wave progression, normal ST-segment, deeply inverted T waves in leads V2-V4 and extend to V1, V5, V6, I and, aVL, suggestive Wellens type B **(Figure 2)**. Further history-taking revealed that he had experienced this kind of symptoms three months prior, and he had a history of uncontrolled hypertension, dyslipidemia, and a current smoker. The patient was then given 5 mg sublingual ISDN. After ISDN administration, he became symptom free. Unfortunately, the patient also refused to be referred to the hospital, and further evaluation of his condition was not performed.

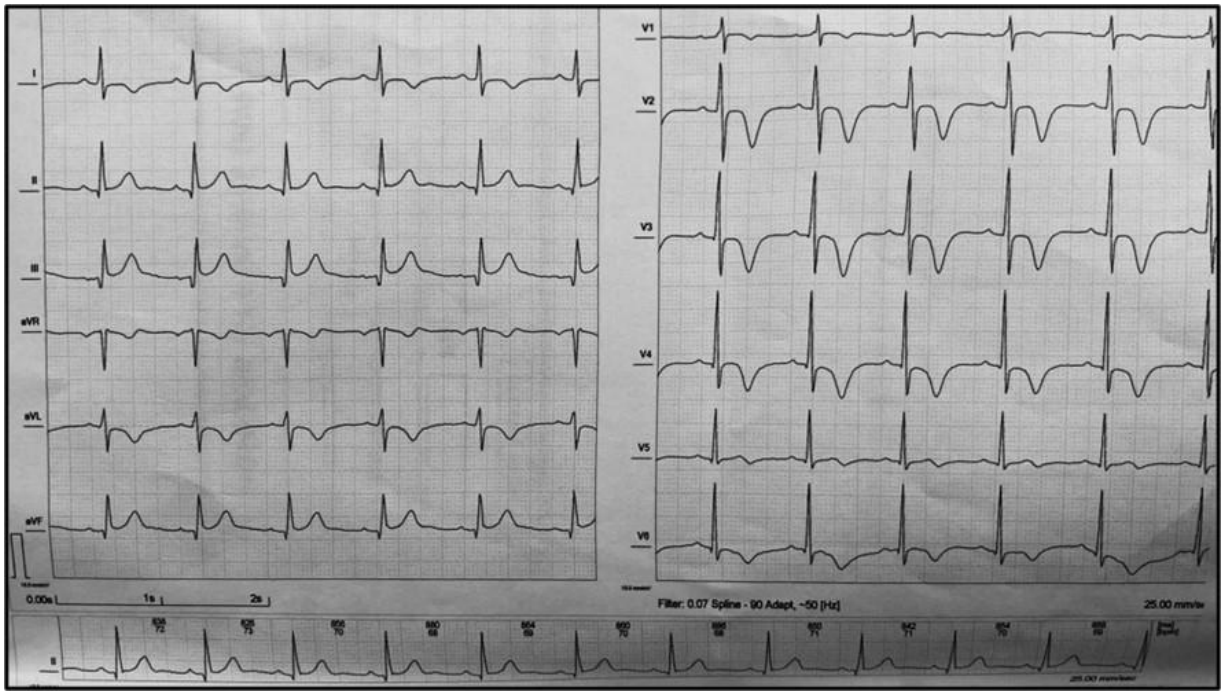

Figure 2. Deeply inverted T waves in leads V2-V4 and extend to V1, V5, V6, I and, aVL, suggestive Wellens type B

DISCUSSION

Acute coronary syndrome is a dreadening condition that is potentially fatal and frequently faced at emergency departments; however, it has a wide range of manifestations that may mislead EMS providers since patients can present with typical pressure-like left-sided chest pain, atypical symptoms, or even

asymptomatic.[6] The Wellens' syndrome ECG pattern can be used as a clue for ACS diagnosis, and some even consider it to be a STEMI equivalent.[7,8]

The ST segment of the ECG represents the ventricular repolarization plateau (phase 2), and the T wave reflects rapid ventricular repolarization (phase 3) of cardiac action potential phases.[9] ST-T wave changes can be secondary due to abnormal depolarization or primary repolarization problems without QRS abnormalities due to injury or ischemia, such as in patients with Wellens syndrome. However, the underlying mechanism of Wellens' syndrome remains unclear.[8] It is regarded as a preinfarction stage of coronary artery disease. Additionally, it is hypothesized that the ECG changes due to relieved proximal LAD artery spasm result in ischemic myocardium reperfusion. There is also a view that it may be related to myocardial stunning or hibernation.

The diagnosis of Wellens' syndrome was made in the presence of type A or type B ECG patterns with additional criteria, including isoelectric or < 1 mm ST segment elevation, preserved R wave progression, absence of Q waves in precordial leads, a recent history of angina, normal or minimal cardiac serum marker elevation, and the pattern seen in a pain-free state.[4] T wave abnormalities may either normalize or progress to ST-segment elevation in symptomatic patients.[10] Some differential diagnoses of Wellens' syndrome include cocaine or morphine-induced coronary vasospasm, left ventricular hypertrophy, pulmonary embolism, persistent juvenile T-wave pattern, late stages of pericarditis, digitalis effect, Takotsubo cardiomyopathy interruption of transient left bundle branch block, and Wolff–Parkinson–White pattern.[11]

Patients with Wellens' syndrome should not undergo stress testing but instead require emergency angiography to assess the severity of the condition since within a week, approximately 75% of those who receive medical management only without revascularization (angioplasty or coronary bypass surgery) experience a significant anterior wall infarction.[12] The mortality rate was as high as 26.67% in patients treated conservatively compared to 0.88% in patients who underwent cardiac catheterization.[13]

In this case report, we describe two patients with Wellens' syndrome who were presented with unexpected complaints. The first patient presented with epigastric pain, which is commonly assumed to be dyspepsia, and the second patient presented after being stung by an insect. Without careful history-taking, especially digging into the risk factors

and appropriate examinations, we could have missed our patient's impending fatal condition. Notably, both of our patients were relatively young. We also highlight the importance of doing observation in patients who present to emergency departments, as we did for our second patient. Unfortunately, both of our patients refused to be referred for further examination and management. This decision could be influenced by several factors, such as lower education and socioeconomic status. A study by Zhang, et al.[14] found that factors that influence the refusal of primary coronary intervention following STEMI include being female, being older than 65 years, having poorer health status, not being married, having a lower body mass index, which is hypothesized to be related to lower economic status, having a lower education level, and not being treated at a tertiary hospital. Despite the main decision being in the patient's hands, we still have to inform and educate our patients thoroughly about their condition.

KESIMPULAN

Physicians and EMS providers should be aware of Wellen's syndrome, as it is suggestively caused by critical stenosis in the proximal LAD artery, which supplies a significant portion of the left ventricle. Misinterpretation of this ECG characteristic could lead to fatal outcomes. Despite the main decision being in the patient's hands, it is our responsibility to inform and educate them thoroughly about their condition.

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