A dangerous twist of the 'T' wave: A case of Wellens' Syndrome

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CASE REPORT

Please cite this paper as: Kavitha Balasubramanian, Balasubramanian Ramachandran, Anandaraja Subramanian. A dangerous twist of the 'T' wave: A case of Wellens' Syndrome. AMJ 2013, 6, 3, 122-125. http://doi.org/10.21767/AMJ.2013.1636

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Abstract

Wellens' syndrome is a condition in which electrocardiographic (ECG) changes indicate critical proximal left anterior descending artery narrowing occurring during the chest pain-free period. Due to the severity of the obstruction, if such cases are managed by early invasive revascularisation therapy, a major threat in the form of a massive myocardial infarction or sudden death may be averted. We present the case of a patient with previous chest pain, whose ECG showing subtle ischemic changes was initially overlooked. A repeat ECG taken during the painless period showed a biphasic T wave, suggestive of Wellen's' syndrome. This was confirmed by an immediate coronary angiogram.

Key Words: Wellens' syndrome; left anterior descending artery obstruction; electrocadiographic changes; revascularization

Implications for Practice

1. **What is known about such cases?** Wellens' syndrome is a condition in which a patient with angina demonstrates typical electrocardiographic changes yet is not experiencing chest pain. Due to lack of pain, this syndrome may be overlooked.

2. **What is the key finding of this case report**? The key finding of this case report is the ECG of a patient with history of angina showing a biphasic T wave in the anterior precordial leads indicating a proximal obstruction of the left anterior descending artery (LAD).

3. **What are the implications for future practice?** All patients presenting with history of angina and ECG suggestive of Wellens' syndrome should undergo an early invasive revascularisation therapy. These patients should not be managed by medical means alone.

Background

Wellens' syndrome is a condition in which typical ECG changes, either a biphasic T wave or deep symmetrical T wave inversions in the precordial leads, occur due to a critical LAD block. The ECG does not demonstrate any pathological Q wave or ST segment variations. Such ECG changes occur during the pain-free period. It is vital to identify this pattern and manage the patient by invasive revascularisation at the earliest opportunity. If left untreated or managed medically, the patient may develop an extensive myocardial infarction or sudden death. The knowledge of such an ECG is also needed, as these patients are contraindicated from undergoing treadmill tests.

Case details

A 37-year-old male, presented to our emergency department with complaints of multiple episodes of retrosternal chest pain, each episode lasting 10-15 minutes. The pain radiated to his left arm and was associated with breathlessness and chest tightness. He gave history of a similar pain episode three months ago, but of a lower intensity, which had resolved spontaneously. He is a smoker and consumes alcohol on a regular basis. He is not a cocaine user. There is a family history of coronary artery disease. He gave no history of being a diabetic, hypertensive or being on treatment for a cardiac illness.

On examination, he was conscious, oriented and not in pain. He was moderately built with a BMI of 22kg/m2. His pulse was regular at 88 per minute; blood pressure was 140/110mmHg. The systemic examination was essentially normal. The basic lab tests including his fasting lipid profile were normal. The serum biomarkers of cardiac injury were positive.

Figure 1: This ECG taken during the chest pain shows very subtle prominence of T wave in the precordial leads V2 and V3.

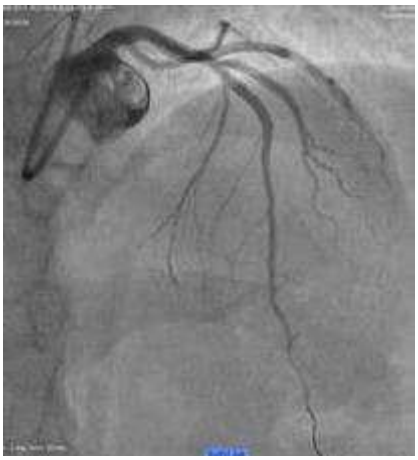
An electrocardiogram (ECG) taken 24hrs prior to the presentation, during the episode of pain is shown in **Fig 1**. It shows a prominent T wave in leads V2 and V3, suggestive of early grade 1 ischaemia. However this was missed initially and the patient was sent home with medications for heartburn. A repeat ECG taken at our hospital is displayed in **Fig 2**. It shows a biphasic T wave pattern, especially in V2, V3 & V4 with little or no ST elevation and a characteristic acute angle ST – T. There is normal R wave progression and no pathological Q waves. This pattern is suggestive of Wellens' syndrome indicating a proximal LAD obstruction.

Figure 2: This ECG taken after 24hrs during pain-free interval, shows a biphasic T wave pattern in V2, V3 and V4. There is little or no ST elevation and a characteristic acute angle ST – T. The R wave progression is normal with no demonstrable pathological Q waves.

He was started on antiplatelets, nitrate and a statin. A 2D echocardiogram did not reveal any regional wall motion abnormality. A coronary angiogram (CAG) showed a 100% block due to a thrombus in the proximal left anterior descending artery (Figure 3). Percutaneous transluminal coronary angioplasty (PTCA) was performed and a stent was placed in the LAD, after which the flow reverted back to normal (**Fig 4**). The ECG taken after reperfusion therapy revealed normalisation of the T waves in V2 and V3 which were biphasic previously (**Fig 5**). The patient was advised to continue antiplatelets and statin on discharge. He was also counselled against the use of tobacco and alcohol. On follow up, he did not report further angina and is compliant with the medication.

Figure 3: A still from the CAG shows 100% block in the proximal LAD artery due to a thrombus, indicated by the arrow mark.

Figure 4: A still from the CAG showing normalisation of flow in the LAD post PTCA.



Discussion

Wellens' syndrome, also known as LAD coronary T-wave syndrome,[1] was originally described by de Zwaan C, Bar FW

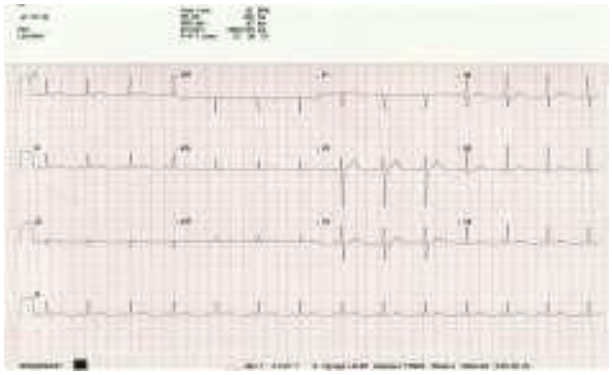
and Wellens HJ in 1982. The patients studied by them had a history of angina, and their ECGs showed changes which developed during the pain-free period.[2]

Types of this syndrome according to the ECG description are:[1]

Type 1: Biphasic T waves } in V2 & V3
Type 2: Deep T wave inversion

Such changes if present in an asymptomatic patient, require immediate management. Wellens' syndrome is thought to be due to reperfusion of the ischaemic myocardium. It has been studied in various case series, with the conclusion that if left untreated, patients would eventually develop extensive anterior myocardial infarction with cardiac failure or sudden death. The treacherous point in this syndrome is that during the pain, the T wave changes (grade 1 ischaemia) may be subtle and easily missed, while glaring T wave changes do occur during the pain-free interval. These are liable to be missed as the ECG may not be repeated during that asymptomatic period. By comparing the T wave changes in this patient at initial presentation as, 24 hours later and post-stent, one can see that a high index of suspicion and ECG reading skill is required to catch this catastrophic syndrome at the earliest (Figure 6).

Figure 5: The ECG taken after PTCA and stenting shows normalisation of the biphasic T waves in leads V2, V3 and V4.

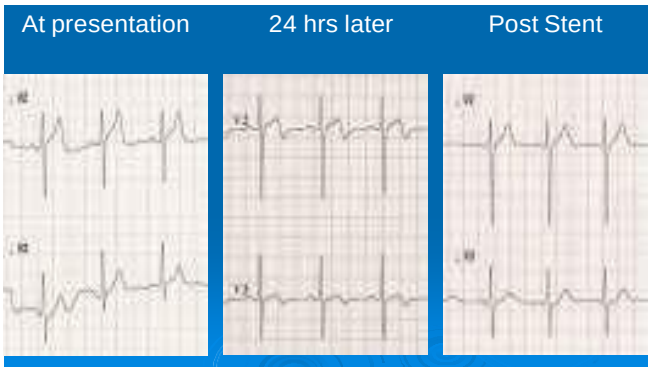


This syndrome can be easily missed:

1. There is a history of angina, however the patient is asymptomatic during the period when ECG shows the T wave changes.
2. The cardiac enzymes may not be elevated.
3. The classical ECG features of ischaemia, i.e. ST segment deviation (>2mm) or pathological Q waves are absent

The importance of this syndrome was first demonstrated by de Zwaan and Wellens in 1982 through their study of patients with unstable angina, when it was found that 18% of the study subjects had this ECG pattern. The study results indicated that 75% of the subjects who did not undergo revascularisation developed anterior wall infarction within a few weeks. Hence, this classical ECG pattern later came to be known as Wellens' Syndrome. In a second study by de Zwaan and Wellens conducted in 1989 on anginal patients with this pattern on the ECG, all patients were found to have significant proximal LAD disease.[3]

Figure 6: Comparison of the ECGs taken during the chest pain, during the pain-free interval and post-stent placement.



We conclude that:

1. Wellens' Syndrome is a useful ECG marker of a major proximal LAD obstruction.
2. If left unrecognised and/or untreated or undertreated (only medical management), the syndrome usually evolves into a major infarction.
3. Patients with such a pattern in the ECG must not undergo any form of cardiac stress test due to the danger of sudden death
4. Since the ECG is a simple, cost-effective tool that is readily available, awareness by the treating physicians of Wellens' syndrome is essential for preventing life-threatening complications by prompt intervention.

References

1. Kardesoglu E, Celik T, Cebeci BS, Cingozbay BY, Dincturk M, Demiralp E.. Wellens' syndrome: a case report. J Int Med Res. 2003 Nov-Dec;31(6):585-90.
2. De Zwaan C, Bär WHM, Wellens HJJ. Characteristic electrocardiographic pattern indicating a critical stenosis high in the left anterior descending coronary artery in patients admitted because of impending myocardial infarction. Am Heart J. 1982 Apr; 103(4 Pt 2):730-6.
3. De Zwann C, Bar FW, Janssen JH et al. 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. 1982 Apr; 103(4 Pt 2):730-6.

PATIENT CONSENT

The authors, Kavitha Balasubramanian, Balasubramanian Ramachandran and Anandaraja Subramanian declare that:

1. They have obtained written, informed consent for the publication of the details relating to the patient in this report.
2. All possible steps have been taken to safeguard the identity of the patient.
3. This submission is compliant with the requirements of local research ethics committee.