

Acute Inferior Myocardial Infarction Presenting as Anterior ST Segment Elevation Myocardial Infarction on ECG

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Abstract

A 51-year-old man presented to the emergency department with acute substernal chest pain. ECG showed ST-segment elevation in the left precordial leads. Coronary angiography demonstrated an occlusion of the right coronary artery (RCA) and no significant stenosis in left anterior descending coronary artery (LAD). The occlusion of a non-dominant RCA may result in anterior ST-segment elevation ECG changes, which could disorient both general and interventional cardiologists.

Keywords

Myocardial Infarction, Occlusion, Electrocardiogram, Coronary Angiography

1. Introduction

The ST-segment elevation in the precordial leads V_1 - V_6 is characteristically a hallmark of ST-segment elevation myocardial infarction (STEMI) of the anterior left myocardium, which is caused by an occlusion of the left anterior descending (LAD) coronary artery [1] [2]. Here, we report a case of a patient with acute anterior myocardial infarction who underwent acute coronary angiography. In contrast to the expected LAD occlusion, we found an occlusion of the right coronary artery (RCA), which was treated by primary percutaneous coronary intervention (pPCI).

2. Case Report

A 51-year-old man presented to the emergency department with substernal chest pain of 40 minutes duration. The chest pain was associated with nausea and sweating. He had a medical history of hypertension. On admission, his blood pressure was 170/85 mmHg, heart rate 54 beats per minute, and respiratory rate of 18 breaths per minute. An electrocardiogram (ECG) showed ST-segment elevation in the left precordial leads V₂ through V₄, T-wave inversion in leads II, III, and aVF (Figure 1). The troponin I level was 92 ng/L (normal value < 14 ng/L). The patient underwent acute coronary angiography, which demonstrated no significant stenosis in the LAD (Figure 2(a)). The dominant left circumflex coronary artery (LCX) was mildly diseased (Figure 2(b)). In contrast to the ST-segment elevations in the left precordial leads V₂ through V₄, a complete occlusion of the proximal RCA (Figure 2(c)) was documented. The RCA occlusion was treated successfully by primary percutaneous coronary intervention (pPCI), including the implantation of a drug-eluting stent (Figure 2(d)). After the pPCI, the patient was free of angina pectoris and hemodynamically stable. The troponin I level rose to a peak of 860 ng/L (normal value < 14 ng/L) 11 hours after the procedure. The abnormal ST-segment elevations remained unchanged in the follow-up post-procedural ECGs. The patient was set on guideline-directed medical therapy, and was referred to a cardiac rehabilitation clinic.

3. Discussion

The ECG stays the essential diagnostic method of coronary artery disease. On 12-lead ECG, the ST-segment elevation in the precordial leads usually indicates a

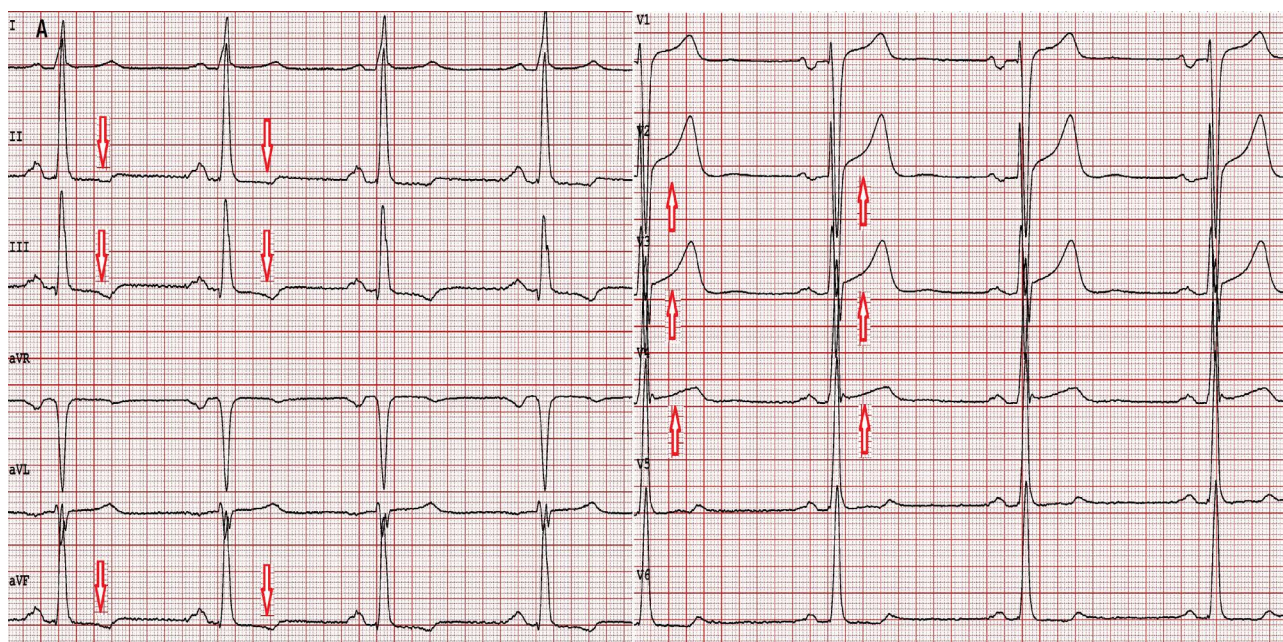


Figure 1. A 12 lead electrocardiogram at patient admission, showing ST-segment elevations in the left precordial leads V₂ through V₄ (arrows ↑), T-wave inversion in leads II, III and aVF (arrows ↓).

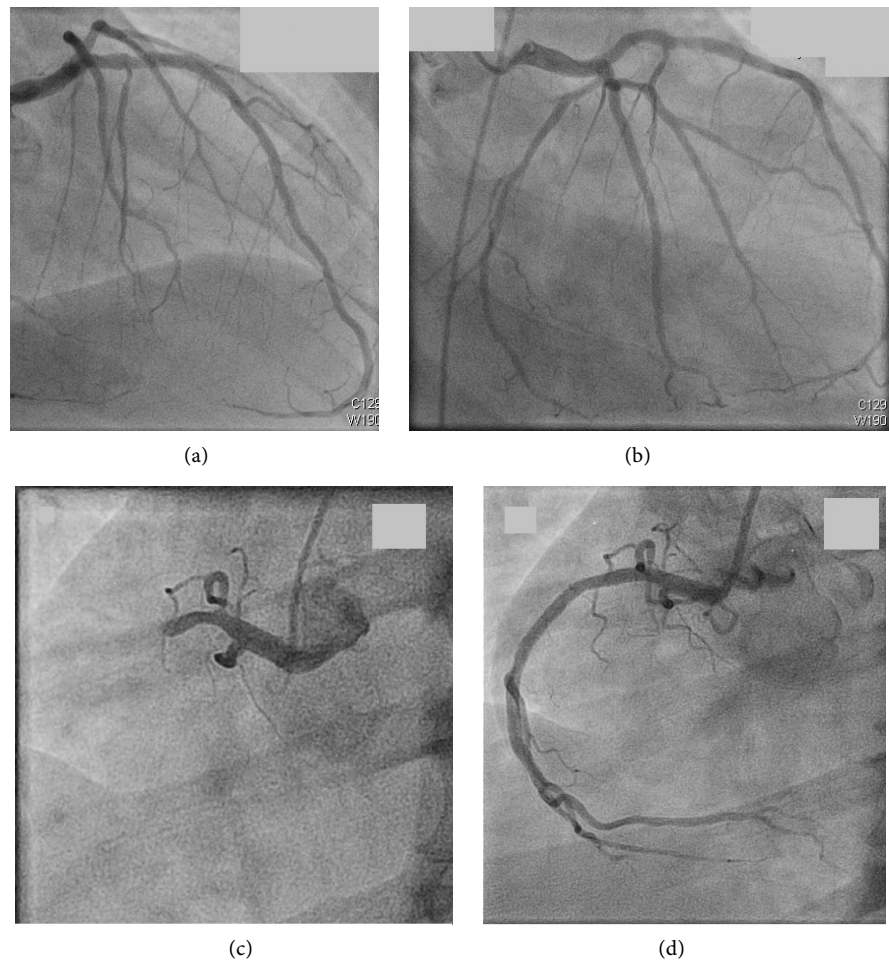


Figure 2. (a) Coronary angiography shows the LAD without significant stenosis. (b) Coronary angiography shows a dominant LCX without significant stenosis. (c) Coronary angiography shows a complete occlusion of the proximal RCA. (d) Coronary angiography of the RCA post recanalization and pPCI.

STEMI of the anterior myocardial wall due to an acute occlusion of the LAD or one of its diagonal branches [1] [2].

In case of a dominant-RCA occlusion, it is presupposed that the electrical changes of inferior left ventricular infarction mask the anterior changes of right ventricular infarction, resulting in a typical pattern of inferior ST-segment elevation myocardial infarction. A non-dominant RCA supplies only the right ventricular free wall, and the occlusion of this artery is not associated with inferior left ventricular infarction, but may result in anterior ST-segment elevation ECG changes [3].

Several reports described the association between anterior ST-segment elevation and the occlusion of a dominant RCA in the context of a collateralization from branches of the left coronary artery system [3] [4] [5] [6] [7]. However, there are only scarce data describing the relationship between anterior ST-segment elevation and the occlusion of a non-dominant RCA [8] [9] [10] [11]. Fin *et al.* revealed a right ventricular myocardial infarction caused by a

critically stenotic non-dominant RCA in a patient with anterior ST-segment elevation using magnetic resonance imaging [12]. In this case report we described a rare case, in which the occlusion of RCA caused atypically anterior ST-segment elevation on ECG.

We believe that this case will be of interest to medical students, general practitioners, internists, general and interventional cardiologists. We recommend that interventional cardiologists should be aware and prepared for such cases; especially in the selection of an appropriate PCI strategy.

4. Conclusion

The anterior ST-segment elevation in precordial ECG leads could disorient the interventional cardiologists since the occlusion of a non-dominant RCA may be responsible for this paradoxical phenomenon.

Disclosures

Verbal and written informed consent was obtained from the patient for his de-identified information to be published in this article.

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Conflicts of Interest

AM, AR and MN received honoraria for presentations from AstraZeneca.

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