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Acute Myocardial Infarction by Right Coronary Artery Occlusion Presenting as Precordial ST Elevation on Electrocardiography

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ABSTRACT

It is rare to observe ST-segment elevation in only the anterior leads and not the inferior leads during right coronary artery occlusion. We describe a case with acute myocardial infarction (MI) by right coronary artery occlusion who developed ST-segment elevation only in the precordial leads V1 to V3. (**Korean Circ J 2010;40:536-538**)

KEY WORDS: Electrocardiography myocardial infarction.

Introduction

Acute ST-segment elevations in the precordial leads generally suggest acute occlusion in the branches of the left coronary artery. Occlusion of the right coronary artery (RCA) may cause infarction of the inferior wall of the left ventricle with or without right ventricular (RV) myocardial infarction (MI), manifested as ST-segment elevations in leads II, III, and aVF. Anterior ST elevation due to occlusion of an RCA branch may be a mirror image of RV ischemia.¹⁻⁴ We describe a patient with mild ST elevation in leads V1 to V3 caused by acute occlusion at the proximal segment RCA with rich collateral flow from the left coronary artery.

Case

A 52-year-old male smoker with no medical history presented to the hospital because of substernal chest pain lasting for forty minutes which was associated with shortness of breath and diaphoresis. On admission, his blood pressure was 170/100 mmHg, heart rate 76 beats per minute, and re-

spiratory rate of 20 breaths per minute. Electrocardiography (ECG) showed ST-segment elevations in the left precordial leads V1 through V3, and T-wave inversions in leads III and aVF (Fig. 1). The patient's creatine kinase level was 287 IU/L (normal range 22-169) with an MB fraction of 8.0 ng/mL (normal range 1-5) and troponin I of 3.4 ng/mL (normal range 0-1.5).

A diagnosis of acute anteroseptal wall MI was made, and the patient was immediately taken to the catheterization laboratory for percutaneous coronary intervention (PCI). First, RCA catheterization was done, and it showed a proximal complete occlusion. Angiography of the left coronary artery system demonstrated insignificant stenosis, and there was collateral flow of thrombolysis in myocardial infarction (TIMI) grade II to the RCA (Fig. 2). The patient underwent percutaneous transluminal coronary angioplasty with coronary artery stenting to the infarct-related RCA. Echocardiography performed after PCI demonstrated mild hypokinesis of the inferior wall of the left ventricle and a normal RV.

The in-hospital course of the patient was uneventful, and he was discharged from the hospital 5 days later. There remained T-wave inversion in leads III and aVF without development of Q-wave.

Discussion

In cases of evolving Q-wave MI due to RCA occlusion, the presence of ST elevation in V1 to V3-V4 occurs when the occlusion is proximal to the branch that perfuses the RV.⁵ Acikel et al.³ reported ST-segment elevations in leads V1 through V3 caused by occlusion of the RV branch of the RCA

Received: February 19, 2010

Accepted: March 26, 2010

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while performing primary PCI in a case of acute inferior MI. Therefore, ST-segment elevations in V1 to V3 are explained by an occlusion proximal to the RV branch. Kida et al.⁶⁾ studied

57 patients undergoing PCI of the RCA and observed precordial ST-segment elevations when inferior wall blood flow was maintained by collaterals or codominant circulation de-

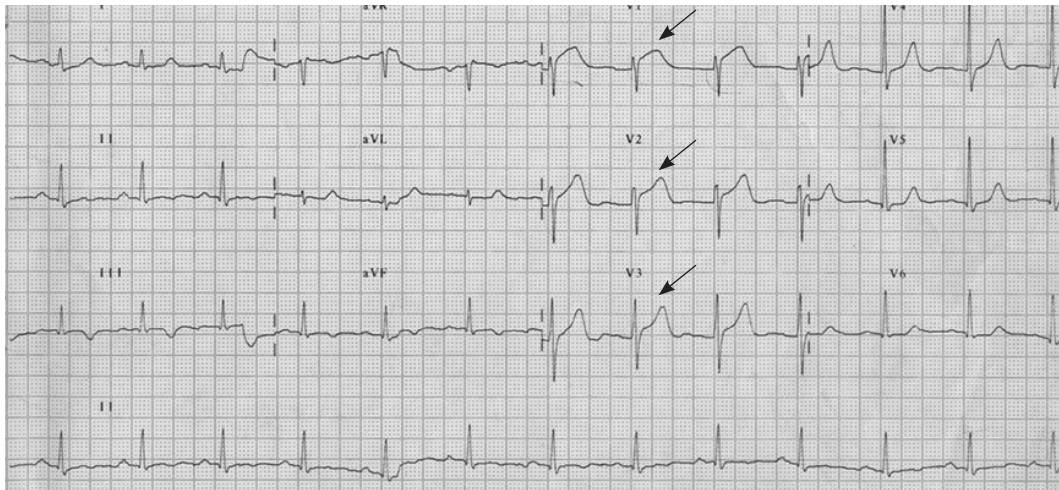


Fig. 1. Standard 12-lead electrocardiography recorded from a patient with chest pain. Note the presence of ST-segment elevations in leads from V1 to V3, and no ST-segment deviation in leads II, III, and aVF.

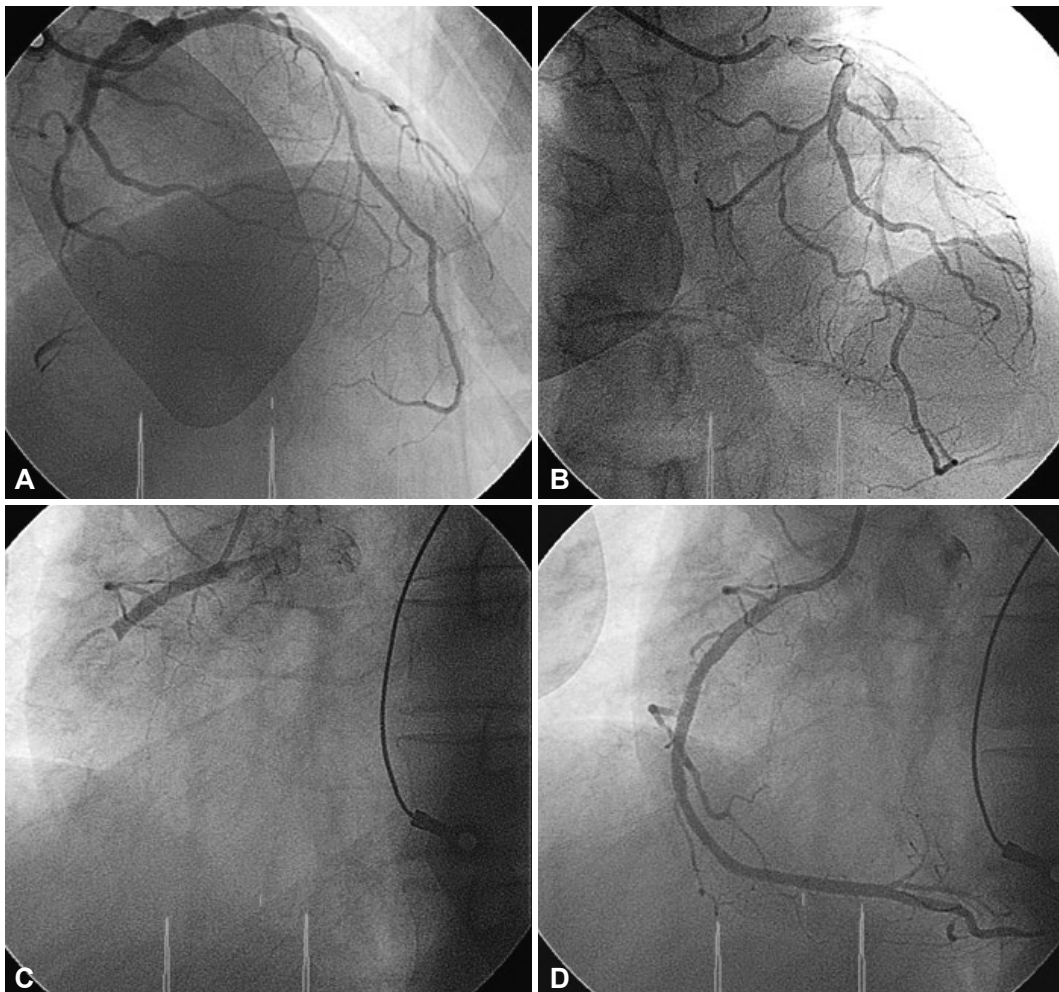


Fig. 2. Coronary angiographic findings of the patient. A: angiographically normal left coronary system. B: the inferior wall of the left ventricle was supplied with rich collaterals from left coronary system. C: coronary angiography showing complete luminal occlusion of the RCA proximally. D: the RCA after percutaneous coronary intervention. RCA: right coronary artery.

spite total occlusion of the RCA. In our patient, rich collaterals from the left coronary artery supplied the inferior wall and the total occlusion of the RCA proximal to the RV branch caused RV infarction despite mild inferior wall ischemia. Although echocardiography performed after PCI showed normal RV size and contractility in our patient, it is probable that RV stunning occurred transiently.

In summary, this is an exceptional ECG showing ST elevation in leads V1 to V3, secondary to occlusion of RCA.

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