Simultaneous Anterior and Inferior Wall Myocardial Infarction in a Patient with Unusual Coronary Anatomy

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We report an unusual case, a 56-year-old male whose right coronary artery (RCA) originated as a separate branch from the middle part of the left anterior descending artery (LAD), undergoing acute coronary syndrome. He had multiple coronary risk factors, including diabetes mellitus and cigarette smoking, in addition to age. Electrocardiograms revealed extensive and prominent ST segment elevation over anterior, inferior, and RV leads with spontaneous resolution. Coronary angiography was done thereafter and showed a critical stenotic trifurcation lesion over the middle LAD and RCA orifice. We performed kissing stents for this tough coronary lesion. However, total occlusion of the stents occurred six months later. This case is unique because of the complicated coronary lesions and clinical manifestations.

Key Words: Acute coronary syndrome • Anomalous right coronary artery • Single coronary artery

INTRODUCTION

An isolated coronary artery anomaly is rare, with an incidence ranging from 0.6% to 1.3%.1 Of these, an incidence of single coronary artery is even rarer (0.0008%). Most of these anomalies are considered benign without clinical significance and are discovered incidentally. Herein, we report an unusual angiographic finding of the right coronary artery (RCA) arising from the middle left anterior descending artery (LAD) in a patient with acute coronary syndrome.

CASE REPORT

A 56-year-old man without previous angina history presented at our emergency department on April 3, 2007 because of prolonged chest pain, which was accompanied with nausea and cold sweating, lasting for two hours. His coronary risk factors included diabetes mellitus and cigarette smoking. On examination, his blood pressure was 88/56 mmHg and pulse rate was 93/min. Other physical examinations were unremarkable. Electrocardiograms (ECGs) revealed ST segment elevation over the inferior leads, extensive anterior leads (Figure 1A), and RV leads (V3R and V4R) (Figure 1B). About 30 minutes later, the patient’s chest pain subsided spontaneously along with complete resolution of the previous ST segment changes (Figure 1C). Echocardiography showed adequate global LV performance without regional wall motion abnormality at that time. A series of cardiac enzymes were elevated with a CK-MB peak of 12.12 U/L and Troponin I of 0.279 U/L. Therefore, he was treated as acute coronary syndrome, which was further stabilized with aspirin, heparin, and nitrates. Subsequent coronary angiography revealed anomalous origin of RCA from the middle LAD.

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Figure 1. (A) Electrocardiogram (ECG) shows ST segment elevation over the inferior and extensive anterior leads. (B) Right-side ECG reveals ST segment elevation in RV leads (V3R and V4R). (C) Complete resolution of the previous ST segment changes 30 minutes later.
There was a critical stenosis at the middle LAD with involvement of the RCA orifice (Figure 2A). We performed “V stent” technique with final kissing to deploy two bare-metal stents (Figure 2B). Unfortunately, this patient developed effort angina gradually six months later even under dual antiplatelet treatment. Coronary angiography revealed instent restenosis with total occlusion at the proximal edge of the stents (Figure 2C), while the left circumflex artery gave good collateral circulations to both LAD and RCA. The patient underwent coronary artery bypass graft surgery thereafter. His condition has been fine till now after bypass surgery.

**DISCUSSION**

An isolated coronary artery anomaly is extremely rare. According to a previous report, our case was classified as single coronary artery, type LII-A, which was considered clinically significant, with potential outcomes including myocardial ischemia, infarct, or sudden death. Our case is unique on several grounds. First, he presented as acute coronary syndrome with dramatic ECG changes, which had no literature precedence. The ECGs clearly demonstrated extensive ST segment elevation with spontaneous resolution over the inferior leads, anterior leads, and RV leads (V3R and V4R). To the best of our knowledge, there were only two cases published in the past as presented with ST elevation myocardial infarct, whose ECGs only showed mild ST segment elevation in the anterior leads without involving inferior leads, especially RV leads. Their RCA calibers were much smaller, with resultant more limited involved territories than those in our case. Second, the coronary angiography disclosed a rare and tough trifurcation lesion. Therefore, this complex coronary anatomy complicated with acute coronary syndrome led to profound ST segment elevation in multiple leads as seen in our case.

It has been suggested that this kind of coronary artery anomaly could cause clinical symptoms probably mediated by two mechanisms, “steal phenomenon” and “accelerated atherosclerosis”. This abnormal coronary anatomy could cause angina through a “steal” effect proven by thallium-201 scan even without coronary artery bypass surgery.
atherosclerotic changes.3,4 In our case, flow stealing superimposed on fixed atherosclerotic lesions could have exaggerated myocardial ischemia. A few studies suggested that a predilection for accelerated atherosclerosis due to a turbulent flow around this abnormal anatomy despite the absence of other coronary risk factors.2,3,5 Although coronary risk factors are present in our case, we could not exclude this possible mechanism also modulating accelerated atherothrombosis process, thereby leading to the subsequent instent restenosis. Turbulent flow easily triggers vasospasm owing to endothelial dysfunction caused by shearing force.6 The diagnosis of coronary spasm in this case was not confirmed angiographically, but it was likely to superimpose on the fixed lesions, in view of the rapid resolution of ST elevation in ECGs. In addition, the initial stenting showed suboptimal result, also possibly leading to the subsequent total occlusion. A middle lesion in the LAD in our patient with origin of the RCA from the LAD would have a pathophysiologic effect similar to that of a left main lesion, and prompt bypass surgery to both arteries should be performed.5

In conclusion, a single coronary artery anomaly associated with occlusive coronary artery disease should be included in the differential diagnosis of extensive ST changes on ECG, involving the left and right coronary territories.2

REFERENCES