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SINGLE CORONARY ARTERY WITH ISCHEMIA AND SUDDEN CARDIAC ARREST

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Abstract

Single coronary artery (SCA) is a very rare finding. Although most cases of SCA are found incidentally on coronary angiography, it can potentially lead to different clinical repercussions.^{1,2} Herein we describe a patient with SCA who had unstable angina with subsequent sudden cardiac arrest, and we provide a brief review of the recent literature.

Case Report

A 52-year-old woman with diabetes mellitus, hypertension, and hyperlipidemia presented with atypical angina. Physical examination, electrocardiography, and serial cardiac enzymes were unremarkable. Resting and stress Tc-99m tetrofosmin SPECT revealed 6% ischemia and 2% scarring in the distal left anterior descending artery vascular territory. The post-stress left ventricular ejection fraction was 50% with mild anteroapical wall hypokinesis. Echocardiography showed no ventricular hypertrophy. She underwent a coronary angiography that demonstrated a large right coronary artery without significant stenosis and absence of the left main coronary and left circumflex arteries. Left anterior descending (LAD) artery was filled distally by the posterior descending artery, which originated from the right coronary artery. There was also no significant stenosis on LAD artery. A contrast-enhanced computed tomography (CT) coronary angiography confirmed the absence of the left main coronary artery and left circumflex artery, with a large coronary artery originating from the right sinus of Valsalva. It coursed around the entire atrioventricular groove and gave off several right ventricular branches, a large posterolateral branch to the lateral wall, a septal branch to the left ventricular septum, and the posterior descending artery, which wrapped around the apex of the heart to supply the anterolateral wall and filled the LAD artery. CT coronary angiography also revealed that the anteroapical area of the heart, where the perfusion defect on the perfusion scan was located, is relatively undervascularized (Figure 1). The patient was managed medically with an angiotensin-converting enzyme inhibitors, nitrate, hydralazine, beta blocker, aspirin, statin, and oral diabetic medications. The patient remained stable during the entire course of hospitalization, and her chest was pain-free on a follow-up visit. However, 11 months later she had sudden cardiac arrest from ventricular fibrillation, likely the result of acute myocardial ischemia. She was successfully resuscitated. Since she was not felt to have an adequate target vessel for coronary artery bypass graft surgery, she was managed with medications and an automatic implantable cardioverter defibrillator.

Discussion

Coronary anomalies are uncommon angiographic findings. One of the rarest variants of these coronary anomalies is SCA. The prevalence of SCA has been reported to be 0.024% to 0.066% of patients undergoing coronary angiography.³ So far, there have been several case reports describing SCA with different presentations ranging from asymptomatic patients to sudden cardiac arrest. SCA originating from the right sinus of Valsalva is an uncommon subset of SCA, and its prevalence has not been specifically reported. Most of the SCA cases were found incidentally on coronary angiography; however, it can potentially lead to several clinical presentations such as angina, syncope secondary to myocardial ischemia/infarction, and sudden cardiac arrest.¹⁻³

Pathophysiology of some particular clinical repercussions in a few subtypes of coronary anomalies have been reviewed by Angelini et al.¹ More recently, myocardial ischemia associated with anomalous origin of a coronary artery from the opposite sinus of Valsalva has been well elucidated.^{1,2} Unfortunately, in our patient with single coronary artery—which originated from the right sinus of Valsalva, with left anterior descending artery filled distally by posterior descending artery and no other coronary arteries from the left system—the mechanism has not been fully understood. Rigatelli et al. proposed a mechanism for myocardial ischemia in SCA, particularly during physical efforts, that is related to insufficiency of oxygen supply to the myocardium.⁴

Coronary angiography used to be the study of choice for the diagnosis of SCA and other coronary anomalies. However, CT coronary angiography and cardiac MRA are noninvasive studies that emerged more recently and could offer better characterization of the anomalies.² In terms of management, strategies to differentiate between benign and malignant SCA have not been established, and there has been no standard treatment for isolated SCA without associated atherosclerotic coronary artery disease. Many patients with SCA without associated atherosclerotic coronary artery disease were managed conservatively with medications and yielded good outcomes.^{5,6} In patients with SCA associated with significant atherosclerotic coronary artery disease,

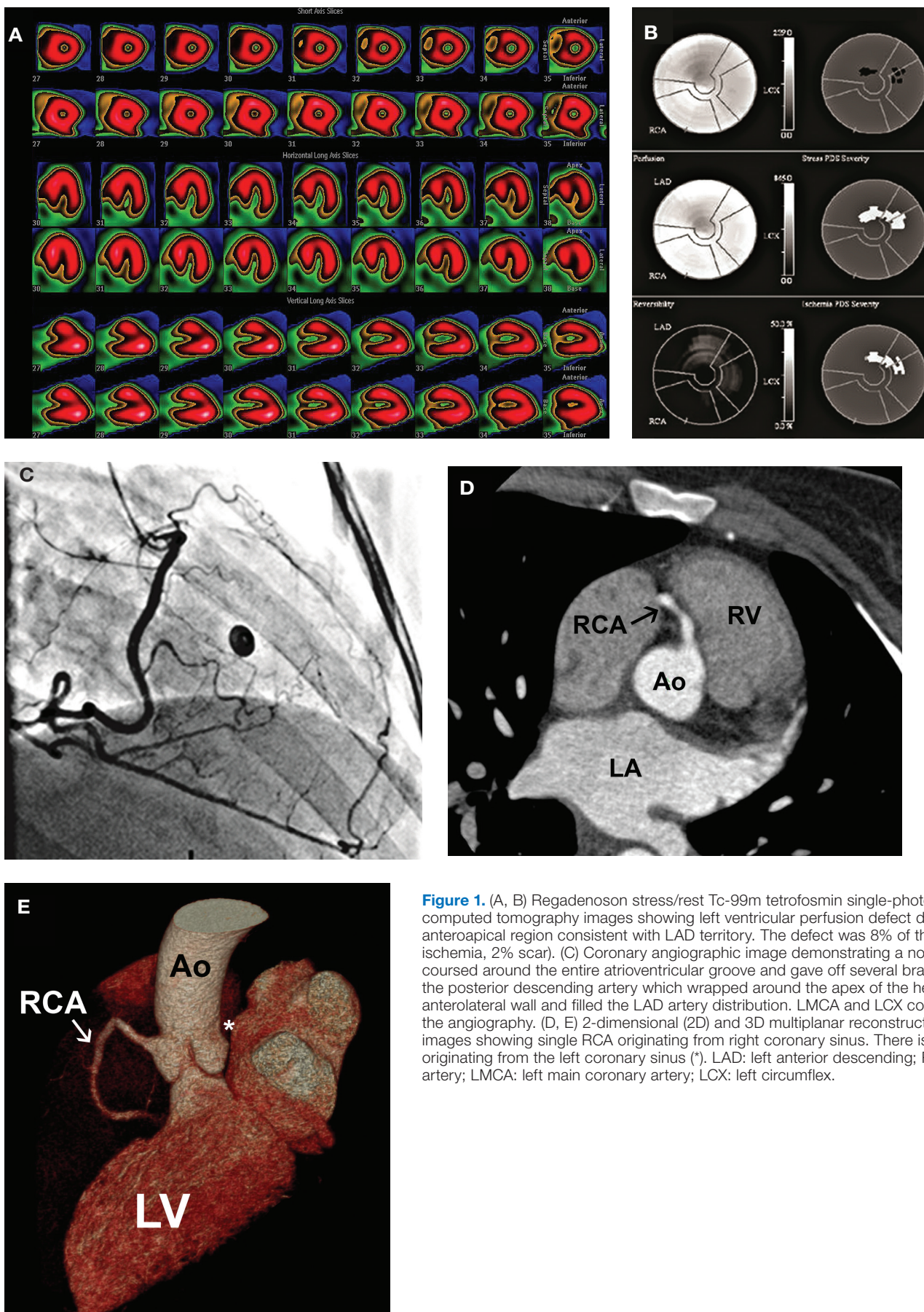


Figure 1. (A, B) Regadenoson stress/rest Tc-99m tetrofosmin single-photon emission computed tomography images showing left ventricular perfusion defect during stress in anteroapical region consistent with LAD territory. The defect was 8% of the total LV area (6% ischemia, 2% scar). (C) Coronary angiographic image demonstrating a nonstenotic RCA that coursed around the entire atrioventricular groove and gave off several branches, including the posterior descending artery which wrapped around the apex of the heart to supply the anterolateral wall and filled the LAD artery distribution. LMCA and LCX could not be seen by the angiography. (D, E) 2-dimensional (2D) and 3D multiplanar reconstruction CT angiographic images showing single RCA originating from right coronary sinus. There is no coronary artery originating from the left coronary sinus (*). LAD: left anterior descending; RCA: right coronary artery; LMCA: left main coronary artery; LCX: left circumflex.

there have been several authors reporting successful treatment using percutaneous coronary angioplasty with stent insertion⁶⁻⁹ and coronary artery bypass graft surgery.¹⁰

Conclusion

In conclusion, we describe a case of single coronary artery that developed myocardial ischemia and sudden cardiac arrest without other explanation. The presence of single coronary artery itself should be considered as a potential cause of myocardial ischemia and sudden cardiac arrest in patients who have no obstructive coronary artery diseases or other explanation.

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Keywords: single coronary artery, coronary anomaly, SCA, sinus of Valsalva

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