

5th International Conference on **Clinical & Experimental Cardiology**

April 27-29, 2015 Philadelphia, USA

Chest pain due to atherosclerotic coronary artery disease in a patient with single coronary artery

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Introduction: Coronary artery anomalies (CAA) are rare, and single coronary arteries (SCA) are even rarer occurring 0.024%-0.066% in the general population undergoing coronary angiography. We present a case of a 65-year-old lady who presented with chest pain and was diagnosed, incidentally on cardiac catheterization as having a single coronary artery supplying the entire heart

Case Presentation: A 65-year-old Polish female with a past medical history of hypertension and diabetes mellitus II presented to ED with the complaints of sharp, substernal chest pain 8/10 in severity, associated with diaphoresis, radiating to left arm, relieved by sublingual nitroglycerine. Her home medications included Metoprolol, Metformin, and Captopril. On physical examination, the patient's vitals include BP 149/89, pulse rate 89, respiratory rate 18, and SaO₂ 99% on 2L of O₂ by nasal canula. Her initial ECG showed ST-depression in lead II and III. The echocardiogram showed an ejection fraction of 55-60%. The patient was subsequently placed on nitroglycerin and heparin drip and transferred to the Coronary Care Unit for close monitoring until cardiac catheterization the following day. The cardiac catheterization showed the patient did not have a RCA. Rather, the blood supply to the heart had all originated from the LMCA. It was found, incidentally, that the patient had a LMCA giving rise to the LAD and LCX arteries. The LCX artery then continued as the RCA to supply the right side of the heart. The LMCA showed 0% stenosis, the LAD showed 30% stenosis, the D1 artery showed 90% stenosis, and the LCX artery showed 30% stenosis. The post-cath diagnosis was a 90% proximal D1 lesion, and an absent RCA. The plan after catheterization was for the patient to do a Lexiscan stress test to assess for ischemia in the D1 territory, and if positive, a PCI to the D1 would be performed. The Lexiscan stress test showed nonspecific T wave changes at rest. Following Lexiscan infusion, ST segment depression appeared with 0.5-1mm ST depression, especially in the inferior and lateral leads suggestive of myocardial ischemia. No significant arrhythmias were noted. Post Lexiscan gated images revealed no significant wall motion abnormality with an EF = 74%. Patient underwent successful PCI and stent to D1 branch of LAD. She was later discharged on Aspirin, Plavix, a β -blocker, and an ACEI and instructed to follow up in cardiology clinic.

Discussion: There are numerous variations of coronary artery anomalies, some benign and others potentially lethal. Fortunately the most common variants among these are the separate origination of LAD and LCX arteries from the LSV, occurring 0.41% of the time followed by the LCX artery originating from the RCA, with the RCA originating from the LSV or LMCA, both of which are benign variants. We presented a patient with a SCA, which may or may not pose a serious threat based on the anomalous anatomy of the vasculature. Our patient had a missing RCA with right heart perfusion originating at the LCA, which gave rise to the LAD and LCX. The LCX was found to be dominant and continued as the RCA branch that wrapped around the heart, classifying her as L1. Our patient has, without a doubt, a left-dominant heart. This anatomical configuration poses a potentially significant threat as a proximal lesion at the LCA can occlude all coronary circulation. Compression of the vessel between the aorta and pulmonary artery would not be of concern as this RCA is a continuation of the LCX and does not branch off the proximal LCA to trace between the two large vessels. In this case, it is imperative that this vessel is maintained patent for adequate perfusion. There was no need to treat the anomalous vessel as it was patent (and found incidentally) but the D1 lesion was significant and was stented and since then the patient has done very well and remains chest pain free.

Conclusion: Coronary artery anomalies (CAA) are rare, and single coronary arteries (SCA) are even rarer occurring 0.024%-0.066% in the general population undergoing coronary angiography. A high index of suspicion is needed for accurate diagnosis and prompt treatment to avoid potentially life threatening complications.

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