Exertional sudden cardiac death in a young athlete with anomalous origin of the left coronary artery from the opposite sinus

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An otherwise healthy and fit 18-year-old African-American male was running sprints while trying out for his high school track team when he suddenly developed severe chest discomfort and collapsed. Assessment at the scene revealed no palpable pulse, cardiopulmonary resuscitation was initiated, and emergency medical services were activated. When paramedics arrived on the scene, they noted his cardiac rhythm as ventricular fibrillation. Multiple attempts at external defibrillation failed to restore a normal rhythm and chest compressions and ventilation were summarily continued. He was transported emergently to a local hospital where initial echocardiography showed severe hypokinesis of the anterior wall and septum. He was then quickly taken to the cardiac catheterization laboratory where an aortogram was performed. Initial interpretation of the images showed a normal appearance of the right coronary artery, while the left coronary artery appeared abnormal in the proximal portion (Figures 1 and 2, black arrows), which was felt to potentially represent either a spontaneous coronary dissection or an anomalous origin. The cine image shows a dilated cardiac silhouette with cardiac standstill and continuation of ventilation (chest compressions were transiently discontinued at the time of contrast injection) at aortography. There is retrograde filling of the left and right coronary arteries as well as retrograde flow of contrast from the aorta (pressure and gravity dependent) into the left ventricle (Figure 1, white arrow), left atrium, ultimately filling the pulmonary veins bilaterally (Figure 2, white arrows). The patient was then taken emergently to the operating room where a rapid but thorough inspection of the patient’s anatomy by the attending cardiothoracic surgeon revealed no evidence of aortic or left main coronary artery dissection. The left ventricle was found to be firm and non-contractile. An anomalous origin of the left main coronary artery was identified, originating in the right sinus of Valsalva. The left main coronary artery coursed between the aorta and the main pulmonary artery. The surgeon then performed saphenous vein grafting to the left anterior descending and diagonal coronary arteries along with placement of a left ventricular assist device. Following these events, he was transferred to our institution for continued support and urgent evaluation and consideration for cardiac transplantation.

A prospective consecutive case series of 1950 patients reported a 0.15% incidence of anomalous origination of the left coronary artery from the right sinus.1 In a series of over 6 million military recruits in the United States, the authors showed that of 64 cardiac deaths occurring during extreme physical training, 21 (33%) were found to exhibit anomalous origination of the left coronary artery from the opposite sinus.2 Though the pathophysiological mechanisms are yet to be fully elucidated, one proposed mechanism for sudden cardiac death (SCD) in patients with anomalous left coronary arteries originating from the opposite sinus is intramural proximal intussusception of the ectopic artery at the aortic-root wall with resultant compromised myocardial perfusion and critical ischaemia leading to ventricular fibrillation.3 This case is a dramatic example of an individual who was successfully resuscitated following SCD in the setting of an anomalous left coronary artery originating from the opposite coronary sinus. Although the incidence of this anomaly appears to be relatively rare, the clinical significance and ramifications are life altering and potentially devastating to young individuals and their families.4

Conflict of interest: none declared.

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References


