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CLINICAL IMAGE

One Ostium, Multiple Risks: A Single Coronary Origin Presenting as Acute Coronary Syndrome

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Coronary artery anomalies are uncommon congenital variations of the coronary anatomy that can remain undiagnosed yet pose a significant risk of potentially fatal cardiovascular events, such as myocardial infarction (MI). Among them, the single coronary artery (SCA) anomaly-where all coronary vessels originate from a single ostium-is particularly rare and clinically challenging. We present the case of a patient with a solitary coronary ostium in the left sinus of Valsalva, presenting with acute coronary syndrome (ACS). This is a rare yet potentially life-threatening congenital coronary anomaly. A 68-year-old male patient presented at the emergency department two hours after experiencing severe chest pain. His medical history was significant for diabetes mellitus, hypertension, and active smoking. The preliminary physical examination revealed a blood pressure of 105/75 mmHg, a heart rate of 92 bpm, a respiratory rate of 25 breaths per minute, and an oxygen saturation of 95%. Cardiac auscultation was unremarkable and revealed normal heart sounds without murmurs. Importantly, the initial electrocardiogram (ECG) demonstrated sinus rhythm at 76 bpm with pronounced ST-segment depressions in leads DII, aVF, and V3-V6, indicating significant myocardial ischemia (Figure 1). The patient was immediately diagnosed with non-ST elevation MI and was urgently hospitalized to the intensive care unit and administered a loading dose of 5000 IU unfractionated heparin and 300 mg acetylsalicylic acid. Subsequent coronary angiography revealed a unique coronary architecture in which all coronary arteries originated from a single trunk anomalously from the right-anterior sinus of Valsalva (Figure 2). Notably, several significant coronary artery stenoses were identified, including a 50% stenosis in the left main coronary artery, a 40% stenosis in the proximal left anterior descending artery, a 50% stenosis in the first obtuse marginal artery, and an 80% stenosis in the circumflex artery. Additionally, a critical near-total occlusion (99%) was detected at the ostium of the right coronary artery (RCA), along with diffuse narrowing along its entire course. Only the collaterals were able to sustain distal RCA perfusion. Angiography was successfully performed via the transfemoral approach employing a JR4 diagnostic catheter. The patient was immediately scheduled for an early coronary artery bypass graft procedure due to his hemodynamic stability and evidence of retrograde filling. The postoperative course was unremarkable, and he was discharged in a stable condition with appropriate medical therapy.

A rare but clinically relevant congenital disorder, the SCA anomaly is defined by a single ostium that gives rise to all coronary arteries. It is frequently asymptomatic, yet it is capable of precipitating severe cardiovascular complications such as angina pectoris, ACS, or even sudden cardiac death (SCD).[1] The anomalous origin of the left coronary artery from the right sinus of Valsalva is not common, occurring in 0.02-0.05% of individuals. Even though many patients remain

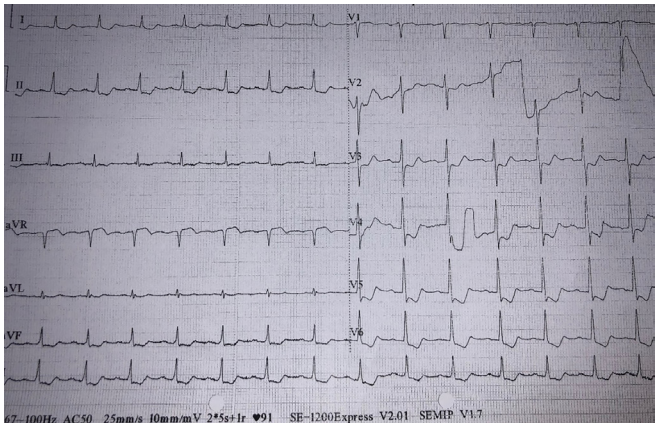

Figure 1. ECG demonstrates ischemic findings before the angiography
ECG: Electrocardiogram

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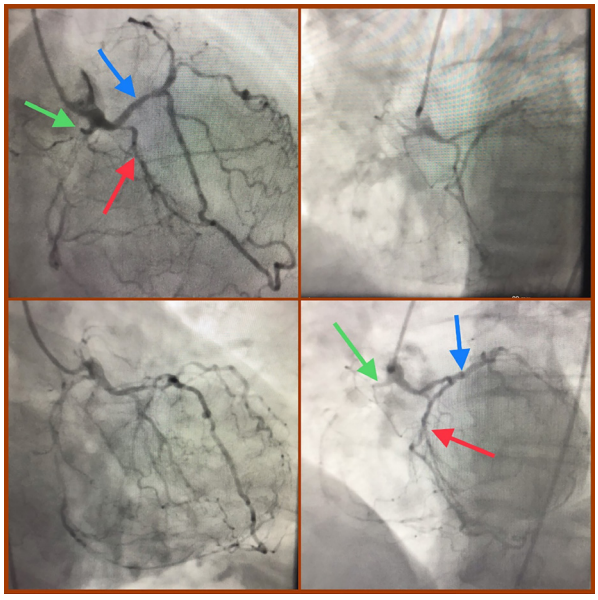

Figure 2. Coronary angiography (single coronary artery). Green arrow: right coronary artery. Red arrow: circumflex coronary artery. Blue arrow: left anterior descending artery

asymptomatic, it is linked to SCD in young individuals, particularly after vigorous exertion. Depending on the anatomical subtype, the prognosis varies; the anterior variation is usually benign, while the intraarterial course is the most serious.[2] There is an elevated risk of sudden death in some cases where a coronary artery runs between the aorta and the pulmonary artery. SCA with atherosclerotic stenosis is a rare occurrence among coronary abnormalities.[3] Moreover, these patients often exhibit atypical ECG manifestations, which makes prompt diagnosis and treatment challenging. Therefore, careful consideration and customized approaches are crucial when performing coronary interventions in patients with anomalous coronary anatomies.[4] Although these cases are challenging, success can be achieved if the anatomical characteristics are carefully considered. Coronary artery anomalies are being diagnosed more frequently due to the growing use of angiography and may be accompanied by multiple coronary stenoses, as this case demonstrates.

Considering this case, the main learning objectives might be summarized as follows: 1) SCA, though rare, is a critical congenital anomaly that may asymptomatically predispose individuals to life-threatening cardiac events. 2) Early detection and precise diagnosis of SCA are critical, as misdiagnosis or delayed identification significantly increases the risk of developing ACS and SCD. 3) Optimal patient outcomes require a meticulous, individualized revascularization strategy that meticulously considers each patient's unique anatomical variations. 4) Maintaining awareness of SCA during coronary angiography is vital to limit the risks associated with excessive contrast administration and avoid procedural complications caused by catheter manipulation.

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