

Letter to the Editor

Acute myocardial infarction in the setting of anomalous single coronary artery

Infarto agudo al miocardio en el contexto de una arteria coronaria única anómala

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Dear Editor,

We present two cases regarding a single coronary artery with ST-segment elevation myocardial infarction, which can broaden the knowledge of this unique coronary malformation and improve patient prognosis.

A single coronary artery (SCA) is a rare congenital anomaly, accounting for approximately 0.026% of all coronary anomalies.^(1,2) While SCA is often asymptomatic, it can manifest as a severe acute myocardial infarction or, in fatal cases, sudden cardiac death (SCD).⁽³⁾ These cases underscore the importance of considering coronary artery anomalies in ST-segment elevation myocardial infarction (STEMI), particularly when an SCA arises from the aortic trunk, supplying the entire myocardium with compromised blood flow and potentially fatal consequences.⁽⁴⁾

Case 1: A 56-year-old male presented to the emergency department (ED) with typical chest pain. A subepicardial lesion was shown in the 12-lead electrocardiogram (ECG) in the anterior and inferior leads. Systemic fibrinolysis with Tenecteplase was administered, meeting reperfusion criteria. Three hours later, chest pain started again, with re-elevation of the ST-segment. During coronary angiography, cannulation of the right coronary artery (RCA) was unsuccessful due to an anomalous origin from the left anterior descending artery (LAD) (**Figure 1**) and a total thrombotic occlusion of the left mid-segment of the LAD, where a drug-eluting stent was placed with reperfusion restored.

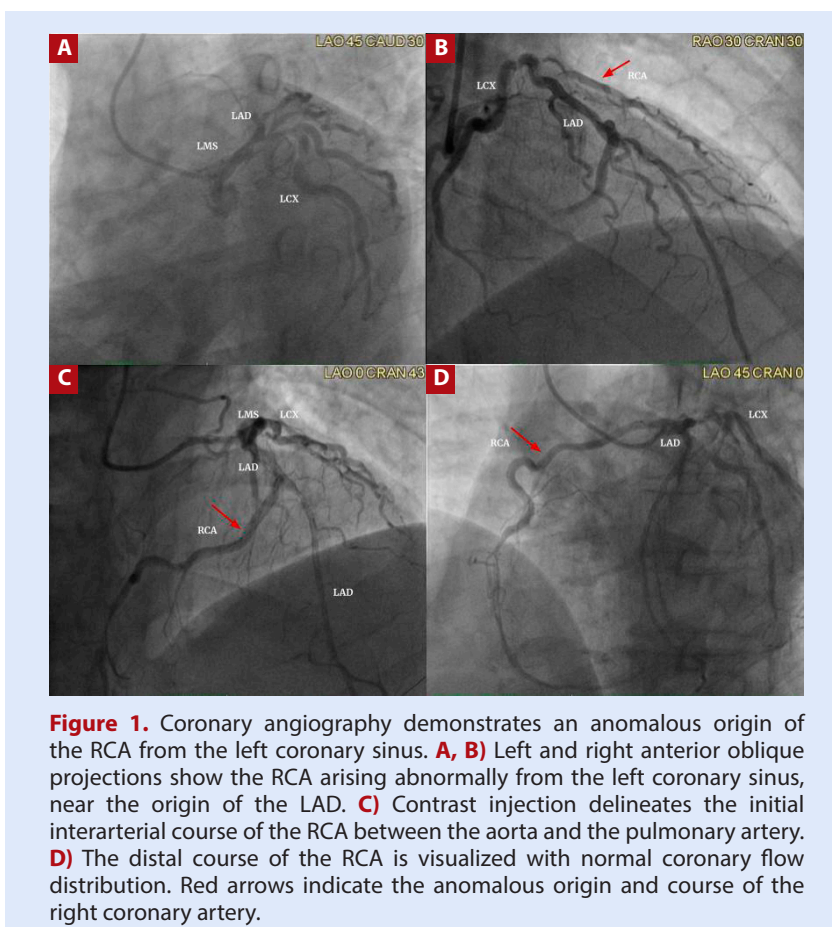


Figure 1. Coronary angiography demonstrates an anomalous origin of the RCA from the left coronary sinus. **A, B**) Left and right anterior oblique projections show the RCA arising abnormally from the left coronary sinus, near the origin of the LAD. **C**) Contrast injection delineates the initial interarterial course of the RCA between the aorta and the pulmonary artery. **D**) The distal course of the RCA is visualized with normal coronary flow distribution. Red arrows indicate the anomalous origin and course of the right coronary artery.

Case 2: A 74-year-old male presented to the ED with oppressive chest pain associated with diaphoresis and nausea. The ECG revealed ST elevation in the inferior and posterior leads. Emergent coronary angiography identified an anomalous origin of the RCA from the left circumflex artery (LCX) (**Figure 2**), with the LCX being the culprit vessel treated with a drug-eluting stent.

does not alter the established electrocardiographic criteria for STEMI, it does influence the extent of ischemia due to the unique coronary distribution, with a high potential for extensive myocardial involvement if the single artery becomes occluded.^(7,8)

Coronary angiography remains the initial and essential diagnostic step for confirming coronary anatomy and

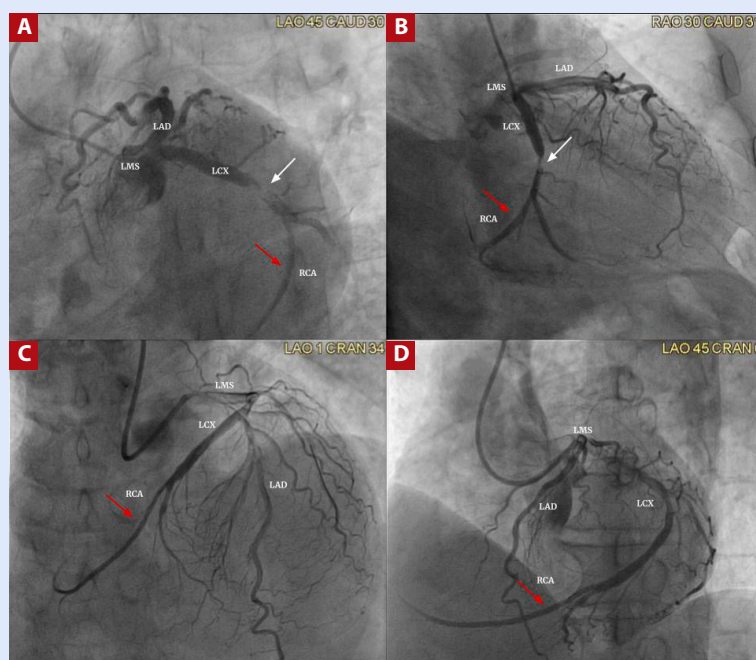


Figure 2. Coronary angiography demonstrates an anomalous origin of the RCA from the left coronary sinus. **A, B**) Left and right anterior oblique projections show the abnormal emergence of the RCA from the left coronary sinus, near the origin of the left main stem (LMS) and the LAD. **C**) The RCA is observed running interarterially between the aorta and the pulmonary artery. **D**) The distal distribution of the RCA is visualized with preserved coronary flow. Red arrows indicate the anomalous origin and course of the right coronary artery, while white arrows mark the normal left coronary arteries.

Coronary anomalies are uncommon; SCA accounts for less than 0.0026% of all coronary anomalies. In its most severe presentations, the development of clinical symptoms and ischemic heart disease can lead to life-threatening outcomes.⁽⁵⁾ Interarterial courses of atypical coronary anatomy are often observed in younger patients engaged in vigorous physical activity, with clinical manifestations arising from dynamic arterial compression. However, these anomalies may also predispose individuals to the development of atherosclerosis. Clinical events in patients with SCA are often of an atherothrombotic origin.⁽⁶⁾

SCA is often discovered incidentally during autopsy or coronary angiography performed in the context of acute STEMI. The diagnosis of myocardial infarction in SCA should be considered when the infarct pattern does not correspond to typical coronary territories on imaging or ECG, such as significant ST-segment elevation involving both the inferior and anterior leads.⁽⁷⁾ While the presence of this anomaly

evaluating the etiology of STEMI, enabling identification of atherosclerotic plaque rupture or thrombotic occlusion of the SCA. Complementary computed tomography angiography (CTA) may further delineate the precise anatomical course of the anomalous vessel.⁽⁸⁾

Management principles for patients with SCA presenting with STEMI are similar to those applied in individuals with typical coronary anatomy, including emergent reperfusion therapy with primary percutaneous coronary intervention (PCI) or fibrinolysis when PCI is not immediately available.^(9,10) Nevertheless, these cases warrant particular attention due to the unique risks and technical challenges associated with the anomalous anatomy. The primary therapeutic objective remains the rapid reperfusion of the occluded artery to minimize myocardial injury and reduce mortality.

In conclusion, STEMI associated with a single coronary artery is a rare coronary anomaly but a life-threatening condition. Coronary angiography is essential in patients

presenting with unusual ECG patterns, such as marked elevation of inferior and anterior leads, due to the complexity of the presentation and the potential consequences, such as SCD, given the potential of a large myocardial territory at risk due to a single coronary supply. Early identification and timely intervention, combined with effective reperfusion strategies, are crucial for improving patient prognosis, as

there is currently no evidence to suggest that any specific management approach offers superior benefits.

Author's Contribution

SA: conceptualization, investigation, writing, and image editing.

LR: conceptualization, investigation, writing, validation, and supervision. **BD:** image editing. **DA:** validation and supervision.

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