

## Anomalous Origin of the Right Coronary Artery with an Interarterial Course

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### ABSTRACT

This commentary presents a 50-year-old female with an anomalous origin of the Right Coronary Artery (RCA) from the left coronary sinus, exhibiting an interarterial course. The condition was discovered fortuitously through coronary CT angiography and confirmed by coronary angiography. The anomaly is clinically significant due to its association with Sudden Cardiac Death (SCD), particularly in younger patients, while its implications in middle-aged populations are less clear. This commentary emphasizes the importance of advanced imaging techniques like Coronary Computed Tomography Angiography (CCTA) in diagnosing coronary anomalies, the need for thorough evaluation in patients with a history of mediastinal radiotherapy, and the critical role of individualized treatment strategies to prevent adverse cardiac events.

**Keywords:** Anomalous right coronary artery; Interarterial course; Coronary Computed Tomography Angiography (CCTA); Sudden Cardiac Death (SCD); Coronary artery disease; Aortocoronary bypass grafting; Congenital coronary anomalies; Middle-aged populations; Mediastinal radiotherapy

### DESCRIPTION

Although the patient was asymptomatic, the electrocardiogram indicated signs of extensive ischemia, prompting further investigation. CT angiography and subsequent coronary angiography confirmed an anomalous origin of the right coronary artery from the left sinus, with an interarterial course and significant stenoses in the left anterior descending artery and right coronary artery. CT angiography underscores the importance of comprehensive imaging for diagnosing such anomalies [1,2].

Anomalous coronary artery origins, especially those with an interarterial course, are well-documented for their potential to cause adverse cardiac events. This condition is rare and considered high-risk due to its association with sudden cardiac death in younger individuals and athletes. The exact mechanisms are not completely understood; however, it is hypothesized that the passage of the ectopic coronary artery between the aorta and the pulmonary artery may lead to functional compression, resulting in ischemia and ventricular arrhythmia [3].

Emerging data suggest that this specific anomaly might be less lethal in middle-aged populations (>35 years). Albuquerque, et al., reported that the anomalous origin of the right coronary artery with an interarterial course has a favorable mid-term outcome in middle-aged individuals, with most cases managed conservatively [4]. Warner, et al., found no significant difference in survival between patients with a right coronary artery from the opposite sinus of Valsalva with an intramural course and those with benign coronary anomalies such as left circumflex coronary arteries with a retroaortic course, which is not associated with cardiac events [5]. The intramural course, an anatomical variant, of the anomaly characterized by a shared media between the proximal portion of the ectopic coronary artery and the aorta [6], causes congenital stenosis of variable degrees and is also considered a variant at risk of cardiovascular events [1,2,7].

These studies are retrospective and limited by the relatively small number of patients. However, in this case, the presence of concomitant significant coronary lesions justified surgical intervention, as conservative management alone might not suffice in preventing potential adverse events. The decision to perform aortocoronary bypass grafting on the Right Coronary

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Artery (RCA) and Left Anterior Descending (LAD) was based on the identified significant coronary lesions, despite the patient's asymptomatic status. Coronary artery bypass surgery involved the left internal mammary artery being grafted to the anterior interventricular artery, and the right coronary artery being grafted with the radial artery, with its proximal portion ligated upstream of the graft to avoid competitive flow [8,9].

The patient presented significant post-radiation stenosis, downstream of the compression zone of the pulmonary artery and the aorta. Given that the functional stenosis was only 30%, it was not considered responsible for the observed ischemia. The coronary lesions observed in the patient are likely linked to radiation-associated heart disease, which commonly affects large vessels like the left main trunk, LAD, and RCA. These high-risk lesions require revascularization even in asymptomatic patients. Considering the anatomical complexity, Coronary Artery Bypass Grafting (CABG) is often a more suitable treatment option compared to percutaneous interventions in this particular situation [10]. Nevertheless, we think angioplasty could be an interesting option for the treatment of concomitant stenosing coronary lesions, in middle-aged patients with a right coronary anomaly and interarterial course, due to its potentially benign nature.

## CONCLUSION

This case underscores the importance of thorough diagnostic evaluation in patients with a history of mediastinal radiotherapy and highlights the potential for significant coronary artery disease even in asymptomatic individuals. The evolving understanding of the natural history of coronary anomalies, particularly in middle-aged populations, supports a more nuanced approach to management, based on individual patient profiles and the presence of significant coronary artery disease.

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