

Ostial and Proximal Coronary Stenosis in Right Coronary with Anomalous Origin and Course: Case Report and Literature Review

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Introduction

So classified when observed in less than 1% of the general population, coronary artery abnormalities do not necessarily predict high risk of life. Most of them are clinically benign¹ and are not often associated with other congenital cardiac malformations^{2,3}. However, the clinical manifestations may vary from asymptomatic patients to those with angina pectoris, myocardial infarction, syncope, arrhythmias and sudden death^{3,4}, and the pathophysiological mechanisms are highly variable⁵.

In this publication, we report the case of a patient with atypical chest pain referred for computed tomography angiography of coronary arteries whose study confirmed the origin of the right coronary artery in the left coronary sinus (ACOSVO-right), which corresponds to about one quarter of the ectopic origins of the coronary arteries. This report aims to discuss the clinical importance of this anomalous finding based on literature review.

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Male patient, 40, classified in cardiovascular risk factors smoker, hypertensive and dyslipidemic — clinically presented atypical chest pain with and without any connection with longstanding physical stress and extensive family history of ischemic heart disease. Referred for exercise testing, the patient showed no abnormalities on echocardiography suggestive of ischemia. For investigation of coronary artery disease, we opted for computed tomography angiography conducted for thoracic aorta and coronary arteries with GE equipment, with 128 cuts per rotation (CTHD750), synchronized with echocardiography, non-ionic contrast injection (70 mL) and saline solution (30 mL) in a peripheral vein. Betablocker was administered to obtain a heart rate of 60 beats per minute, as well as sublingual coronary

Keywords

Coronary Vessel Anomalies; Coronary Stenosis; Risk Factors; Chest Pain, Death, Sudden, Cardiac; Multidetector Computed Tomography.

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vasodilator. The study showed, apart from atherosclerotic manifestations with mild luminal obstruction in the anterior descending artery and marginal branch, an anomalous origin of the right coronary artery from the left coronary sinus between the anterior wall of the aorta and the posterior wall of the pulmonary artery. Along this way, there was a clear reduction in size (Figures 1, 2, 3A and 3B). After discussing the case, the team chose to follow the patient and recommended to reduce the practice of strenuous exercise.

Discussion

Coronary anomalies assume incidence of approximately 1% and 0.3% in patients undergoing cardiac catheterization and autopsy, respectively. Even though most of the findings are accidental, they constitute risk factors for sudden cardiac death (SCD) mainly in young adults^{2,4}.

Studies in the United States show that the anomalous coronary artery (ACA) appears as the second leading cause of SCD in athletes in the absence of additional cardiac abnormalities6, second only to hypertrophic cardiomyopathy and affecting this group much more than non-athletes7. More recently, different definitions or classifications and analyzes carried out not only through autopsy but also through angiography and echocardiography, refer to an incidence covering 0.1% to 8.4%, which shows difficulties in establishing its magnitude¹. In one of the few prospective analyses in which diagnostic criteria were involved, a series of 1,950 consecutive coronary angiographies confirmed an overall incidence of 5.64% for ACA and 1.07% for coronary artery originating in the opposite sinus of Valsalva (CAOOSV). In 86% of cases of CAOOSV (0.92%), the right coronary artery originating in the opposite sinus of Valsalva (right CAOOSV) was identified⁵. A more recent study investigated, for four years, the prevalence of CAOOSV from a sample of 8,522 consecutive patients undergoing coronary angiography. The study found the diagnosis in 72 (0.84%) cases and 20 (0.23%) of them were compatible with right CAOOSV, and 11 (0.12%) with left coronary artery originating in the opposite Sinus of Valsalva (left CAOOSV)8. In the study by Yamanaka et al.9, which had a sample of 126,595 patients undergoing angiography, 137 (0.22%) patients were found to have right CAOOSV and 22 (0.047%) with left CAOOSV in 13,686 (1.3%) cases of ACA. The results of these studies and others reinforce the indication that the right CAOOSV is more common than the left CAOOSV⁹.

The malignant potential of CAOOSV is based on various postulates and the exact pathophysiological mechanism for the occurrence of ischemia has not been determined despite clinical stress tests³. The acute angle of the ectopic origin of the artery, with consequent reduction in size, mechanical compression caused by the interatrial course, abnormal closing

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Figure 1 – Three-dimensional reconstruction demonstrating the trunk of the left and right coronary artery originating in the left sinus of Valsalva.



Figure 2 – Oblique image in MIP (maximum intensity projection) shows the path of the right coronary artery and sharp reduction of its ostium and proximal caliper.

of the coronary ostium and arterial spasm due to endothelial injury^{3,7,10-12} are possible explanations. The identification of an interatrial and intramural course, for example, would lead to a significant reduction in the storage capacity of the epicardial coronary system, since the pressure in the large vessels generate, according to the Laplace Law, greater stresses on their walls, reflecting the compression of vessels lower in continuity¹². It is assumed, therefore, that the course taken by the coronary artery, as well as its branches, is clinically more important than the ectopic origin.

The risk for SCD is relatively higher especially in symptomatic patients < 35 years of age identified with left CAOOSV^{1,2,13} whose incidence of the event is significantly higher¹⁴. Invasive

treatment, either by surgical repair or by stenting, is most recommended for this group. However, decisions about the best therapeutic approach should always be made in the light of individual anatomical aspects, especially in those patients whose age is above established cutoff points¹. In asymptomatic patients without myocardial ischemia, with > 35 years of age, diagnosed with right CAOOSV, intervention is not recommended and although limiting heavy physical exercising is debatable, it still seems to be the most appropriate measure^{2,13}. As for asymptomatic patients with < 35 years of age, therapeutic management remains unclear².

Computed tomography with multiple detectors (CTMD) allows multiplanar reconstructions and three-dimensional

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Figure 3 – A: Three-dimensional reconstruction showing the relationship of the right coronary artery with the great vessels. B: Three-dimensional reconstruction showing the relationship of the right coronary artery with the great vessels (trunk of the pulmonary artery and its branches in transparency).

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visibility of the entire coronary tree with excellent demonstration of the course of the coronary arteries and surrounding tissues. However, the lack of hemodynamic information limits the interpretation of functional relevance of each finding. Another obstacle of computed tomography is exposure to radiation, although the new generations of computed tomography scanners are able to perform coronary angiography with exposure to low levels of radiation. The ability to demonstrate important anatomical information such as the site of origin, the entire course of the vessel, a proximal intramural course, a slot hole and the acute angle of ectopic origin, led to accept the CTMD as the standard of reference for evaluation of suspected coronary anomalies¹⁵.

Authors' contributions

Research creation and design: Medeiros, Augusto K, Feldman CJ, Medeiros TM, Medeiros, Alexandre K; Data

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