

Super Dominant Right Coronary Artery and Posterolateral Left Atrial Branch Anomalous Emission

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ABSTRACT

Introduction: anomalous coronary arteries are the second most common cause of sudden death in young athletes, after hypertrophic cardiomyopathy, and are associated with an increased risk of atherosclerosis of variant the coronary branch. In the present report, we describe a patient with a large left atrial branch originating from a superdominant right coronary artery, identified by coronary angiography.

Case report: we present a case of a 53-year-old male patient who had an acute myocardial infarction three months before the hospital admission and since then, has been presenting typical angina. The patient was submitted to coronary angiography via the right radial artery approach. The right coronary angiography showed to be superdominant and it irrigated a large part of the posterior wall of the left ventricle, with parietal irregularities, giving origin to a long and thin anomalous branch to the left atrium, emerging from the posterolateral surface and crossing above the aortic sinus,

Discussion: the increased use of three-dimensional imaging techniques, such as magnetic resonance imaging, computed tomography, coronary angiography, and echocardiography, will elucidate in more detail the anatomical variations and anomalous branches originating on the right coronary artery.

Keywords: Right coronary artery; Angiography; Variation; Right atrium.

Introduction

Anomalous coronary arteries are the second most common cause of sudden death in young athletes, after hypertrophic cardiomyopathy, and are associated with an increased risk of atherosclerosis of variant the coronary branch.

The presence of coronary anatomical variations or anomalous coronary arteries has been observed in 1.3% of patients undergoing cardiac catheterization¹.

The increase in the number of cardiac catheterizations diagnostics in recent years may reveal a greater number of anomalies and relate them to major cardiovascular events².

In the present report, we describe a patient with a high risk and high probability of presenting unstable angina with a previous acute myocardial infarction, presenting a large left atrial branch originating from a superdominant right coronary artery, identified by coronary angiography.

Case report

We present a case of a 53-year-old male patient who had an acute myocardial infarction three months before the hospital admission and since then, has been presenting typical angina, first on minimal exertion, with progression to the resting state, with multiple

visits to the emergency room. The patient also presents systemic arterial hypertension.

There was no history of previous stroke or family history of cardiac death. Physical examination showed bibasal rales with the presence of hepatojugular reflex. Laboratory tests were within the normal range, without elevation of cardiac enzymes, and preserved renal function. The electrocardiogram showed sinus rhythm without signs of acute cardiac injury. The echocardiogram revealed preserved global systolic performance of both ventricles, with an ejection fraction of 75%, moderate left atrial dilatation, and mild mitral regurgitation.

The patient was submitted to coronary angiography via the right radial artery approach. The coronary angiography showed a bifurcated left coronary artery, with slight obstruction of the trunk, a long anterior descending branch that surrounds the cardiac apex with severe segmental obstructions along the first and second diagonals branches. The first, diagonal branch, small and very thin, showed diffuse severe lesions and the second diagonal branch was bifurcated and presented total obstruction in the ostium. On its atrioventricular path, the circumflex branch of the coronary artery presented a severe obstruction in the ostium, compromising the origin of the anterior

ventricular branch and ending on a very thin posterior ventricular branch.

The right coronary angiography showed to be superdominant and it irrigated a large part of the posterior wall of the left ventricle, with parietal irregularities (Figure 1), giving origin to a long and thin anomalous branch to the left atrium, emerging from the posterolateral surface and crossing above the aortic sinus (Figure 2).

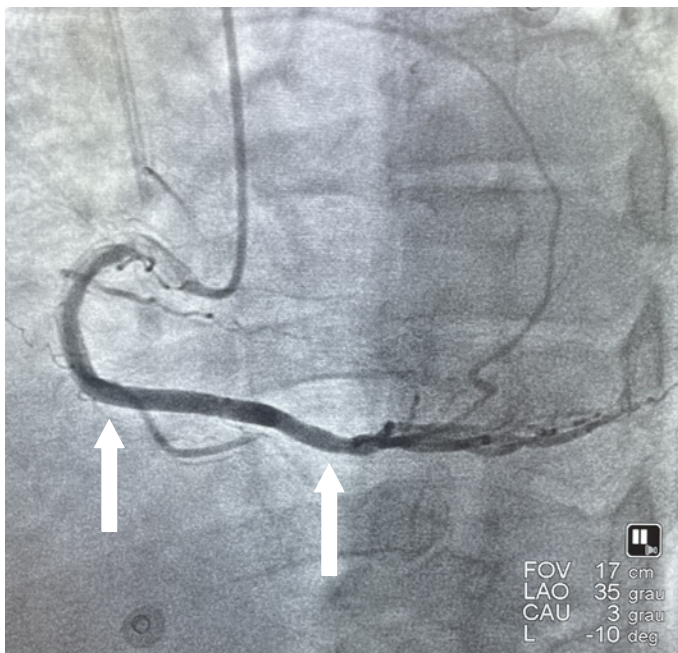


Figure 1. Coronary angiography of the superdominant right coronary artery irrigating a large part of the posterior wall of the left ventricle with parietal irregularities (arrows).

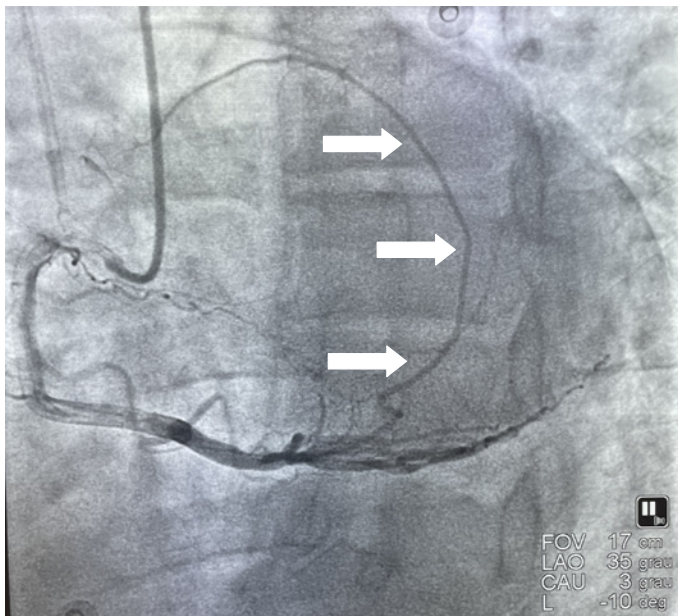


Figure 2. Coronary angiography of the right coronary artery originating a long and thin anomalous branch to the left atrium, emerging from the posterolateral atrial surface, and crossing over the aortic sinus (arrows).

The patient was initially treated with dual antiplatelet therapy, high-dose statin, beta-blocker, full anticoagulation, and vasodilation with an angiotensin-

converting enzyme inhibitor. After two days, a surgical procedure for myocardial revascularization was performed with internal thoracic artery implantation on the anterior interventricular artery and radial artery for the anterior ventricular, circumflex and posterior ventricular branches, with an extracorporeal circulation time of seventy minutes and anoxia of fifty-eight minutes. The procedure was performed without interurrences. The patient evolved with good healing of the surgical wound with improved blood pressure control and no recurrence of chest pain.

Discussion

An anomalous circumflex coronary artery branch was first described by Antopol and Kugel in 1933³. The origin of the left atrial branch from the right coronary artery has also been described as a rare coronary anomaly with only a few case reports available^{3,4}.

Previous studies have shown that it is important to have a detailed knowledge of the coronary atrial branches during catheter ablation for atrial fibrillation⁵⁻⁷. The risk of coronary artery injury is related to collateral damage due to the proximity and orientation of the ablation lesion to the coronary artery itself⁸. Other factors, including lesion size and radiofrequency (RF) energy properties, are also known parameters that can determine the impact of ablation on coronary arteries^{9,10}. However, the coronary arteries course mainly on the ventricular side of the atrioventricular sulcus; therefore, during ablation within the right atrium, there is little risk of damage to the coronary arteries¹⁰.

An important protective factor for the coronary artery injury during ablation is the tissue cooling resulting from the intracardiac and microvascular blood flow, which creates a heat sink⁹. In general, the susceptibility of coronary arteries to thermal damage is inversely proportional to the distance between the electrode and the artery⁹. When RF ablation is delivered to the tissue via an electrode, temperature gradients are created as heat moves from the catheter tip through the tissue. As the temperature decreases through the tissue in a hyperbolic fashion, the likelihood of thermal injury to the coronary arteries decreases, once the distance of the coronary artery from the catheter tip increases⁹.

It is not known whether the application of RF in the vicinity of coronary arteries predisposes to late coronary stenosis⁶. After RF ablation close to the coronary arteries, minimal angiographic changes are observed in the short term⁶. However, between 3 and 9 months after ablation, hyperplasia of the vessels' intima layer, which is not angiographically detectable, may develop. Bertram *et al* (2001)⁷ described two children who developed stenosis of the right coronary artery, identified more than 1 year after the initial ablation procedure. In 1 of the cases, ST-segment elevation was observed soon after ablation, but the angiography

after intracoronary nitroglycerin injection showed no abnormality⁷.

Because of clinical cases like the one reported here as well as elsewhere¹¹⁻¹³, it is clear that anatomy remains a vital part of cardiovascular training. Through hundreds of hours of practice, not to mention significant prior knowledge and experience, cardiovascular less invasive procedures play a vital role in providing not only descriptions of basic and radiologic cardiac anatomy but also several complex cardiac anomalies *in vivo*. It is through these imaging procedures that discoveries are being made, with clinical relevance. The increased

use of three-dimensional imaging techniques, such as magnetic resonance imaging, computed tomography, coronary angiography, and echocardiography, will elucidate in more detail the anatomical variations and anomalous branches originating on the right coronary artery.

Conclusion

Therefore, the identification of this rare left atrial branch that crosses the aortic sinus makes this report of vital importance for the invasive management of complex cases.

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Mini Curriculum and Author's Contribution

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