



Atherosclerotic Disease in a Single Coronary Artery: Right Coronary Artery Supplies Left Anterior Descendens and Left Circumflex Artery with Absent Left Coronary Ostium

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Abstract

We report a case of a 62-year-old man with a right-sided single coronary ostium supplying the complete myocardium. This case was diagnosed based on an aberrant exercise tolerance test and complementary angiography. The patient was revascularized by a coronary artery bypass graft to the single coronary artery because of a significant stenosis in its course.

Learning Objective

Indications for surgical therapy of a single coronary artery are (inducible) myocardial ischemia and anomalous aortic origin of the left coronary artery from the right sinus of Valsalva. Coronary Artery Bypass Grafting is a safe and valuable treatment option.

Background

Coronary Artery Anomalies (CAAs) are a group of several congenital condition characterized by abnormal origin/course or termination of the coronary arteries; the term has been restricted to those occurring in less than 1% of the population [1]. The widespread use of (non)-invasive imaging has lead to a higher prevalence of CAAs in the pediatric and adult population. Often CAAs are incidental findings [2]. Prognosis of CAAs is poorly understood and guideline-recommended therapeutic decisions are supported by a low level of scientific evidence [3]. However, when there is no malignant CAA (e.g., coronary artery originates from pulmonary artery) there is consensus that signs of myocardial ischemia are mandatory before surgery is indicated. Surgery can be performed either by anatomical correction or coronary artery bypass grafting. This depends on the presence of restricted flow over the coronary artery.

Case Presentation

A 62-year-old male, ex-smoker with obesity, arterial hypertension and hypercholesterolemia presented for an annual cardiac check-up in the context of his hobbies. He had no cardiac related complaints, New York Heart Association (NYHA) classification I, electrocardiogram and clinical examination are normal. However, on a stress test, his ECG was positive for inducible ischemia. Echocardiogram showed a normal systolic function, no regional wall abnormalities and normal kinetics in rest and during exercise.

His coronary angiogram revealed a dominant Right Coronary Artery (RCA) arising from the right sinus of Valsalva with a significant stenosis on the RCA (going to the left circumflex artery). There was no identification of a left coronary ostium. There was no clear presence of a Left Anterior Descendens (LAD) artery. The anterior wall was vascularized through small branches coming from the Left Circumflex (LCX) artery and where the inferolateral branch proved to be the largest. The complete system was compromised by a stenosis on the RCA (Figure 1).

Coronary Computed Tomography Angiogram (CTA) confirmed a mon coronary system with the LCX and LAD coronary artery as continuation from the right coronary artery. Both arteries show low grade stenosis and the significant stenosis on the RCA is confirmed. Any other aberrant anatomy was excluded (Figure 2).

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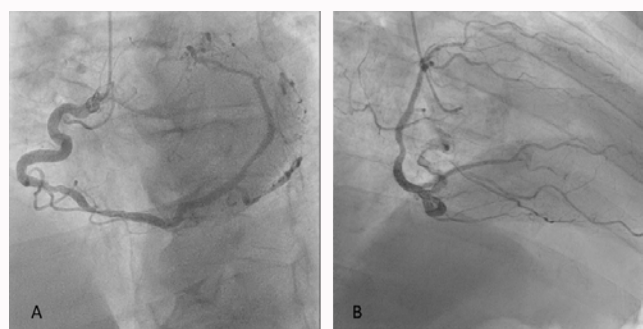


Figure 1: Coronary angiogram, A) 30° left anterior oblique view, B) 30° right anterior oblique view.

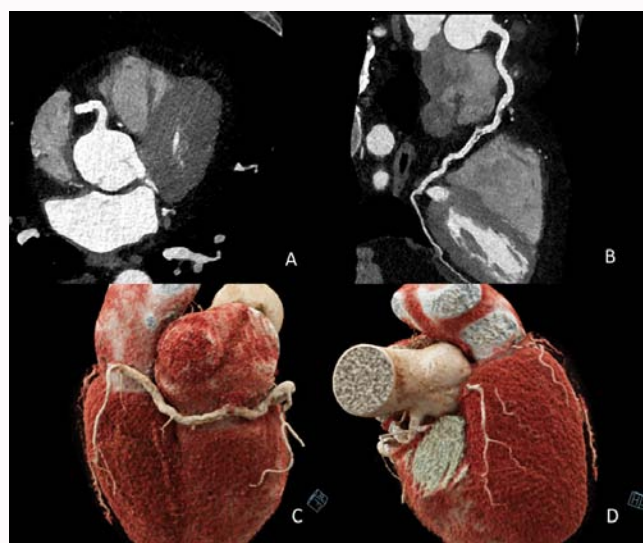


Figure 2: Coronary computed tomography angiogram. A) Ostial anatomy, B) Course of the RCA, C) 3D reconstruction of RCA, D) 3D reconstruction of expected left coronary artery system.

This case was discussed at our multidisciplinary heart team meeting, the consensus was to perform coronary artery bypass grafting on this patient with a LIMA to inferolateral branch construct. The procedure was performed without cardiopulmonary bypass on a beating heart with a skeletonized mammary artery towards the inferolateral branch of the right coronary artery. Both the surgery and post-operative course were uneventful.

Follow-up for 25 weeks shows good recovery with a patient functioning in NYHA classification I, normal ECG and stress test. Life style advice and optimal medical treatment is associated in secondary prevention.

Discussion

This case describes a diagnosis of atherosclerotic heart disease in a patient with an asymptomatic CAA type Single Coronary Artery (SCA). The incidence of isolated SCA in the general population undergoing coronary angiography is from 0.024% to 0.066% [4]. However, 40% of all SCA cases are associated with congenital heart disease such as tetralogy of Fallot, transposition of great arteries, persistent truncus arteriosus and pulmonary atresia [5]. Patients with a SCA are on higher risk for cardiac sudden death, this is often because of associated congenital anomalies. In the subgroup with asymptomatic isolated SCA, it is often associated with an acute

myocardial infarction in the only coronary artery causing ischemia of the complete myocardial area [6].

Diagnosis and classification of SCA is based on conventional coronary angiography, complementary it is useful to perform a CTA or magnetic resonance angiography which allow accurate evaluation of coronary ostial morphology, coronary course, endoluminal assessment and plaque characterization [7]. Functional assessment of the heart can be performed using echocardiography in rest and during exercise to assess regional wall abnormalities and kinetics during rest and stress-test.

Therapy of isolated and asymptomatic SCA is often conservative with best medical therapy and exercise restriction. Indications for surgical therapy are myocardial ischemia and anomalous aortic origin of the left coronary artery from the right sinus of Valsalva [3]. Coronary artery bypass grafting should be restricted to patients in whom there is significant atherosclerosis or when an alternative approach is not feasible because of impaired coronary flow along the vessel. The use of PCI is a possible alternative but is supported by weak evidence and an in-stent restenosis of 13% at 5 years follow-up [1].

Conclusion

This case report illustrates a rare anomaly of a single RCA continuing over the right PDA towards the distal LCX and LAD. Association of noninvasive anatomic and invasive imaging helped us to exclude high-risk anatomic features and guided us in the clinical decision making. This patient had inducible ischemia because of atherosclerotic heart disease as a primary cause rather than his CAA. Therefore, a surgical revascularization was performed with left internal mammary artery towards the PDA.

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