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Coronary Aneurysms and Ectasia as an Unexpected Cause of Myocardial Ischemia

Molina-Castillo Sofía[1,2], Velázquez-Castañeda Raúl[1,2], Sánchez-Romero Miguel Ángel[2], De la Puente-Tawil Ilana[2], Aguerrebere-Lupi José Ángel[2], Martí-Larrucea Irune[2], Fernández-De la Torre María[2], Alexanderson-Rosas Erick[1,3]

[1]Department of Nuclear Cardiology, National Institute of Cardiology Ignacio Chavez, Mexico

[2]Universidad La Salle, Mexico City, Mexico

[3]Universidad Nacional Autónoma de México, Mexico

Abstract

Coronary Artery Aneurysms (CAA) and Coronary Artery Ectasia (CAE) are rare but serious conditions associated with distinct entities and many possible complications. These conditions are often diagnosed incidentally during angiography, nevertheless they usually present with stable angina, atypical precordial pain, or acute coronary syndrome. A 56-year-old male patient is presented in this article after arriving at a local hospital with intense, retrosternal oppressive chest pain associated with nausea and diaphoresis and a history of chronic ischemic heart disease. After a 12-lead Electrocardiogram (EKG) was performed, he was diagnosed with an inferolateral acute ST-Elevated Myocardial Infarction (STEMI) and was admitted to a cardiac catheterization laboratory for coronary angiography, the procedure showed evidence of both CAA and CAE. The main cause of CAA in the adult population is arteriosclerosis and presents as local dilation of the coronary artery, whereas CAE presents as diffuse involvement. Unlike aneurysms, ectasia is more frequently seen in association with atherosclerosis, still, both conditions increase the risk of Acute Myocardial Infarction (AMI) and should be considered in any patient with high clinical suspicion and a history of angina or acute myocardial infarction. Angiography is considered the first-choice diagnostic study.

Keywords: Coronary ectasia; Coronary aneurysm; Myocardial ischemia; Hemodynamics

Introduction

CAA and CAE are uncommon serious conditions that can lead to a variety of complications including myocardial ischemia. Although these two diseases are recognized as distinct clinical entities they often present together. Both CAA and CAE have been associated with disadvantageous outcomes and increased cardiovascular risk [1]. While the underlying cause of these conditions is not yet fully understood, they are associated with atherosclerosis and inflammation; genetic factors have also been identified [2]. Excessive vascular remodeling has been recognized as a major pathophysiological mechanism for both diseases [3]. The main risk factors identified for CAA and CAE include genetic susceptibility, connective tissue disorders, vasculitis, as well as cardiovascular risk factors (including hypertension, dyslipidemia, obesity, and smoking [1,3,4]. The first-choice study for both of these conditions is coronary angiography, however, they are most often diagnosed incidentally when coronary angiography is employed for other diseases. The clinical picture for both conditions involve a wide range of symptoms depending on the degree of involvement. It is usually characterized by stable angina, atypical precordial pain, and/or acute coronary syndrome. Dilatation of the coronary arteries increases the risk of thrombus formation due to turbulent blood flow. Other complications for both CAA and CAE include fistula formation and peripheral embolism. The clinical spectrum is also influenced by elevated inflammatory markers such as Interleukin-6 (IL-6), Tumor Necrosis Factor (TNF) and Red cell Distribution Width (RDW). Although the pathophysiology is poorly understood, the presence of elevated inflammatory markers has been associated with higher mortality [2,5].

It is estimated that 3% to 5% of patients with STEMI have an ecstatic infarct-related artery. Right coronary artery involvement, with predominance of the proximal segments, accounts for 68% of CAE [3]. The lack of information available regarding these cases presents technical challenges and requires elaborate decision-making strategies. Here we present a case of a patient with inferolateral STEMI, and evidence of CAA and CAE demonstrated by angiography.

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Correspondence:
Erick Alexanderson-Rosas, Department of Nuclear Cardiology, National Institute of Cardiology Ignacio Chávez, Juan Badiano N°1, Sección XVI P.C. 14080, Tlalpan, Mexico City, Mexico, Tel: 5551023874;
E-mail: alexandersonerick@gmail.com

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Case Presentation

A 56-year-old male patient with a history of chronic ischemic heart disease presented to a local hospital with intense, retrosternal oppressive chest pain associated with nausea and diaphoresis. EKG revealed an acute inferior STEMI. After unsuccessful thrombolysis, he was referred to the National Institute of Cardiology (Instituto Nacional de Cardiología, INC). On admission to the INC, EKG confirmed the diagnosis of inferolateral STEMI. He was admitted to the cardiac catheterization laboratory for coronary angiography and rescue Percutaneous Coronary Intervention (PCI). During the procedure, an aneurysmal area in the proximal and middle segments was observed in the Anterior Descending Artery (ADA), followed by an eccentric tubular lesion in bifurcation with the first diagonal (Figure 1A). A focal lesion was observed in the ostial proximal segment of the Right Coronary Artery (RCA), ending in an aneurysmal dilation and ectasia (Figure 1B). Unsuccessful balloon angioplasty was performed (Figure 2). A myocardial perfusion study revealed parameters consistent with a high risk of ischemia. Coronary revascularization surgery was performed, with a left internal mammary artery graft to the ADA and an extensive endarterectomy arteriotomy with radial artery roof. The procedure was successful, and the patient gradually recovered.

Discussion

CAA represents a focal dilation of a coronary artery while CAE is a diffuse dilation [6]. Although the etiology is not completely understood, atherosclerosis is the main cause in the adult population and Kawasaki disease is the main cause in the pediatric population [3]. Atherosclerosis is the most common etiology of CAA, other causes include congenital aneurysms, connective tissue disorders and vasculitis (Kawasaki disease primarily in children) [7,8]. CAE constitutes an increased risk for AMI and has been reported as an independent predictor of Myocardial Infarction with Nonobstructive Coronary Arteries (MINOCA) in patients with non-ST-segment elevation myocardial infarction [9]. CAA are characterized by a localized dilation of a segment more than 1.5 times the adjacent normal segments; its incidence ranges from 0.3% to 5.3% [11]. CAA are frequently diagnosed incidentally when patients undergo coronary angiography or when they present symptoms of ischemic heart disease (including but not limited to angina and AMI) [8]. Both CAE and CAA are independent risk factors for AMI and require high clinical suspicion if they are to be diagnosed before the patient presents with angina or AMI. High risk patients should be considered candidates for coronary angiography or imaging modalities, such as high- resolution CT scan and MRI, for the diagnosis of both CAA and CAE. Unlike aneurysms, ectasia is more frequently seen in association with atherosclerosis or as a compensatory mechanism in those cases in which a proximal stenosis is noted in the opposite coronary artery; ectasia is also seen in some coronary artery anomalies, such as anomalous origin from the pulmonary artery, or as a result of a high-flow state, as seen in coronary artery fistulas [10].

Regarding CAA, there is no unified opinion on the primary management for patients with this disease, treatment should be adapted to the context of each specific patient. The clinical presentation, physical findings, and medical history should be taken into account when making a decision; an emphasis must be made on atherosclerosis as well as the size, location and progression of the aneurysms since one of the main lines of treatment is through PCI. Stent placement through PCI is recommended although there is still controversy surrounding its potential complications, such as bleeding (CAA often requires anticoagulation) and stenosis, thrombosis, and implantation impairment due to proximal narrowing of the artery. There is a risk of new aneurysms developing with the use of Drug-Eluting Stents (DES) [11]. When conventional stent placement is not the most convenient option, alternatives such as coil embolization or autologous saphenous vein-covered stent grafting are available. Surgical options should be considered in symptomatic patients with a history of embolization or severe coronary artery disease, as well as any patient with an aneurysm with rupture potential. CAA near a large branch bifurcation, progressive growth of a CAA with angiographic documentation, fistulas, compression of cardiac chambers or a giant CAA (where dilation surpasses the referenced artery diameter by four times) are also indications for surgery over PCI. Aneurysm ligation or excision combined with bypass grafting is the preferred option in patients not candidates for PCI [8]. In the management of CAE, especially when coexisting with CAD, the presence of obstructive lesions and persisting symptoms of cardiac ischemia after medical management are an indication for invasive therapy. Surgical and percutaneous procedures are available, both with positive short and long-term prognosis. PCI with balloon

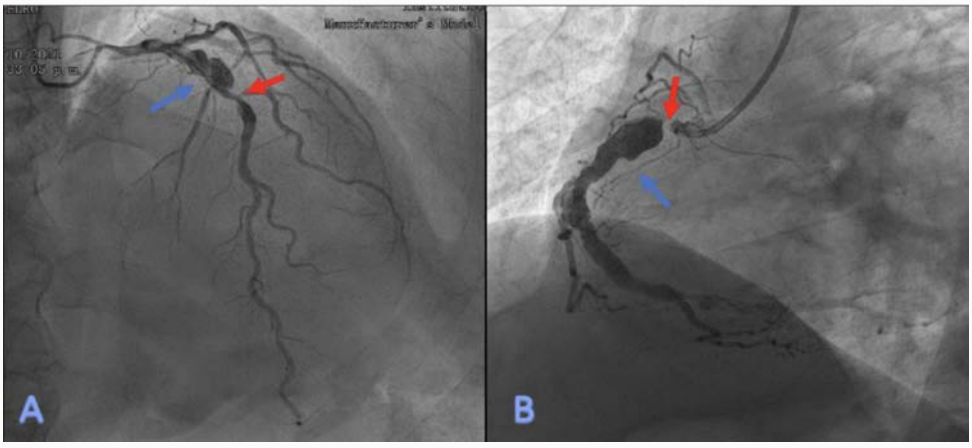

Figure 1: Coronary angiography. A) Left Coronary artery: Anterior descending: the proximal segment presents an aneurysmal zone that extends to the middle segment (blue arrow), followed by an eccentric tubular lesion at its junction with its Medina 1-1-1 diagonal branch with a site of maximum stenosis of 60% (red arrow). TIMI 3 distal flow. B) Right coronary artery: The ostial proximal segment presents a concentric focal lesion with regular borders with a maximum stenosis of 50% (red arrow), followed by an aneurysmal zone with subsequent ectasia (blue arrow).

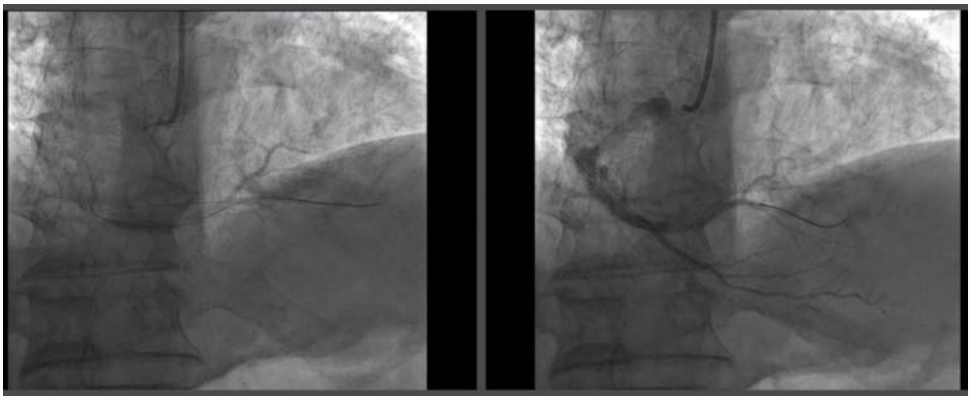

Figure 2: Right coronary artery angioplasty: Failed pharmacoinvasive percutaneous coronary angioplasty of the right coronary artery with a conventional balloon.

angioplasty and coronary artery bypass surgery have yielded good results regarding the restoration of myocardial perfusion. Proximal or distal ligation and aneurysm resection are additional therapeutic options following cases of thrombi within the CAE or in the presence of a significantly large aneurysm [6].

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