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Case Series

Coronary Artery Aneurysm is an Accidental Finding: Case Series and Literature Review

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Received: May 03, 2018; **Published:** June 23, 2018

Abstract

Coronary Artery Aneurysm (CAA) is an uncommon and often accidental finding. CAAs are usually associated with atherosclerosis in adults in Western countries, while Kawasaki disease is the most common cause of CAA in Japan and in children or young adults. Complications associated with CAA include acute coronary syndrome (ACS), thrombosis, embolization, rupture, and vasospasm.

Management of CAA during ACS may represent a unique clinical challenge, particularly in the context of profound thrombus burden.

In this manuscript, we review the clinical presentation, anatomic considerations, and management strategy in five patients presenting with CAA.

Learning Objective: Through this series and in the light of literature, we review the clinical presentation, anatomic considerations, and management strategy in five patients of CAA.

Keywords: *Aneurysm; Atherosclerosis; Coronary Disease; Revascularization; Infarction*

Introduction

Coronary artery aneurysm (CAA) is usually found incidentally during cardiac examinations, it represent anomalies fined in 0.15 - 4.9% of patients undergoing coronary angiography. Coronary artery aneurysm (CAA) is characterized as coronary dilatation that exceeds the diameter of normal adjacent segments or the diameter of the largest coronary artery by a factor of 1.5, aneurysms are observed most commonly in the right coronary artery, and least frequently in the left main coronary artery. Although coronary artery aneurysms are a rare clinical situation, they can be potentially lethal if they are not treated in time [1].

Management of CAA during ACS may represent a unique clinical challenge. CAA treatment consists of medical management, surgical resection, and catheter-based management. In this manuscript, we review the clinical presentation, anatomic considerations, and management strategy in five patients presenting with CAA during an unstable angina. In addition, we review available case reports, pertinent clinical guidelines.

Case Report

Case 1

52 years old, with a smoking as cardiovascular risk factors, admitted for management of anterior ST-elevation myocardial infarction (STEMI) treated with thrombolytic therapy and medical treatment.

Coronary angiography objectified a large aneurysmal segment in the proximal portion of Circumflex (Cx) (Figure 1A) with artery total occlusion of the distal The left anterior descending (LAD), consistent with distal embolization of thrombus (Figure 1B).

The patient remained asymptomatic during the remainder of the hospital course.

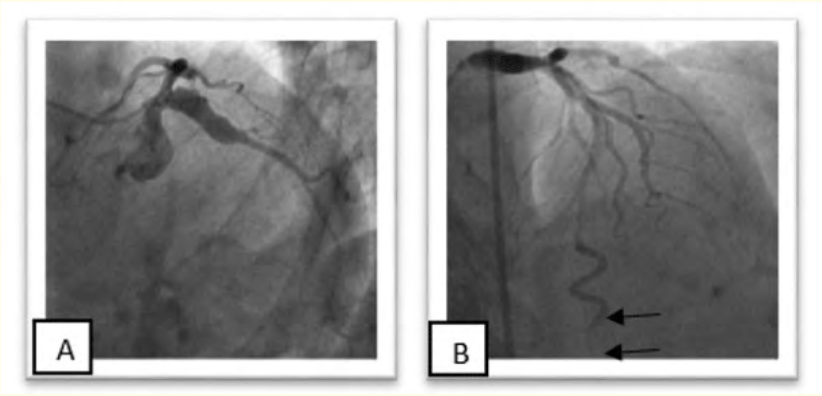

Figure 1: *1A: Large aneurysmal segment in the proximal portion of circumflex (Cx); 1B: Occlusion of distal LAD.*

The patient declined invasive therapy and elected to proceed with conservative management. He was discharged to home after five days on daily aspirin, clopidogrel, carvedilol l, and atorvastatin and has done well throughout follow-up (for two years).

Case 2

A 63-year-old man chronic hemodialysis with history of inferior STEMI presented with recurrent chest pain in the hemodialysis session. Angiography revealed tritrocular lesions with large aneurysmal segment in proximal to the bifurcation with the first obtuse marginal branch of Cx artery (Figure 2A). The LAD presented critical stenosis at the proximal segment (Figure 2B). Many calcified and critical stenosis in the right coronary artery (RCA) (Figure 2C).

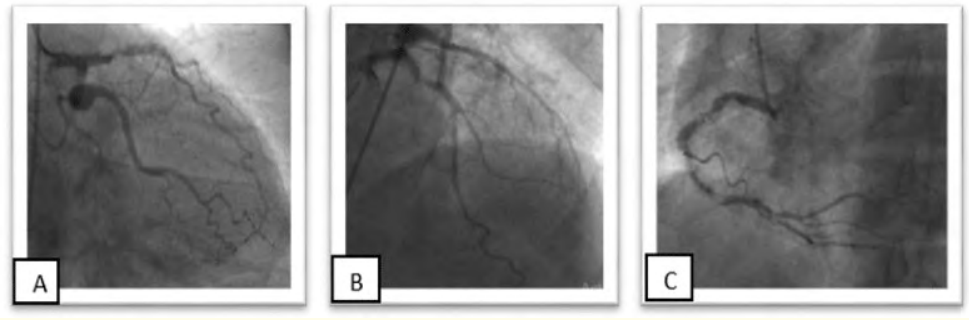

Figure 2: *2A: Large aneurysmal in proximal to the bifurcation marginal branch of Cx; 2B: The LAD presented critical stenosis in the proximal segment. 2C: Many calcified and critical stenosis in the right coronary artery (RCA).*

Surgical treatment was considered for our patient. The patient has undergone a triple aorto-coronary bypass (on distal LAD, mid segment of marginal branch, and on distal RCA).

Case 3

63 years old, with a smoking, android obesity and recent diabetes mellitus as cardiovascular risk factors, he is admitted for management of anterior STEMI treated with thrombolytic therapy at H6 successfully.

ECG: Demonstrated elevation of ST in ASA and in right derivations with presence of QS aspect in inferior derivation.

On coronary angiography, the LAD coronary artery had a aneurysmal dilatation in the mid portion with moderate to severe stenosis (Figure 3A, 3B).

No invasive intervention was undertaken because there was not adequate equipment to treat this lesion and the patient did not have the financial means to buy it and since the patient was stable on the ischemic plane. The patient was managed on medical treatment.

Invasive treatment envisaged later with PTFE-covered stent graft.

Case 4

62 years of age, having as cardiovascular risk factor a smoking, admitted for management of STEMI treated with thrombolytic therapy successfully.

On this presentation, coronary angiography disclosed a large aneurysm in the proximal the LAD (Figure 4A, 4B). The RCA presented a critical stenosis in the mid portion (Figure 4C).

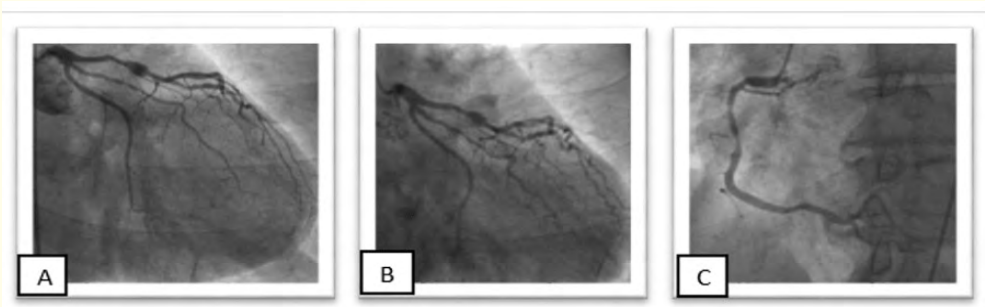

Figure 4: *4A, 4B: Large aneurysm in the proximal segment of LAD; 4C: The RCA presented critical stenosis in the mid portion.*

The RCA was treated with coronary stenting. He was discharged to home on daily aspirin, clopidogrel, nebivolol, and simvastatin and has done well throughout follow-up.

Case 5

A 70-year-old man with past medical history of cardiac pacing for high-grade of atrio-ventricular block, presented with unstable angina. Angiography revealed critical stenosis in the distal portion of the LAD with aneurysmal dilatation (Figure 5A, 5B).

We could not use a polytetrafluoroethylene (PTFE)-covered stent graft to keep the diagonal branch, since the patient was threatening on the ischemic plane a drug-eluting stent was used to treat this lesion (DES) (Figure 5C, 5D).

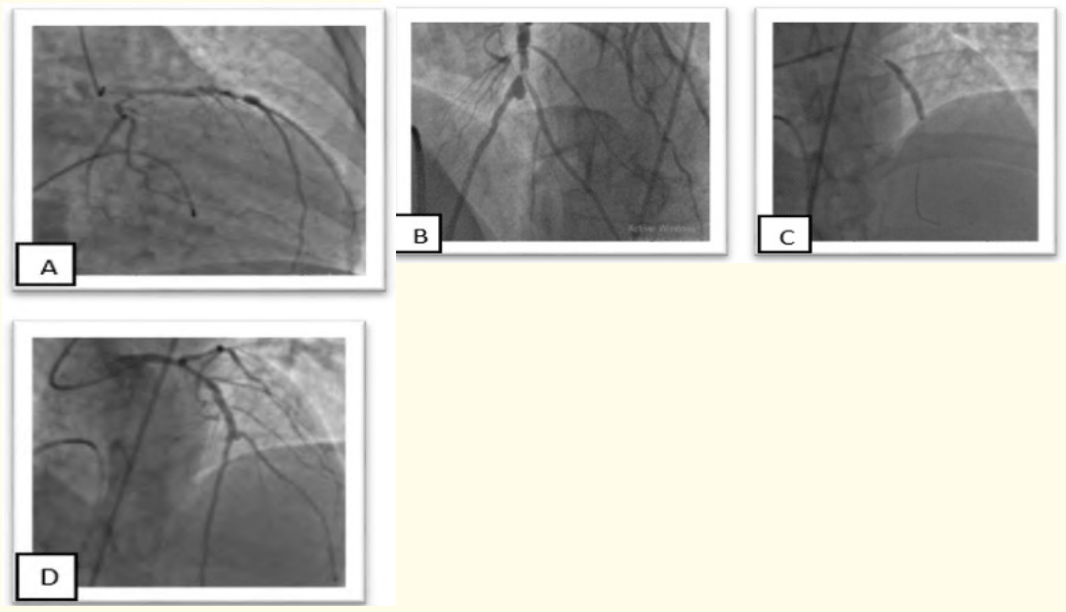

Figure 5: *5A, 5B: Critical stenosis in the distal portion of LAD with aneurysm dilatation; 5C, 5D: Stenting of LAD.*

Discussion

The first case of the coronary artery anomaly described as an aneurysm lesion was reported in 1761 by Morgagni [3]. This vascular anomaly is described as dilation of blood vessel lumen, exceeding the diameter of the adjacent normal segment, or more precisely - dilation exceeding the largest diameter of a coronary vessel of a given patient more than 1.5 fold [1].

On the other side, Markies., *et al*. used a term "ectasia" to describe this type of vascular pathology, and according to the morphological picture and the number of affected arteries, they proposed a classification of aneurysms [4].

The term "giant" CAA is generally reserved for a dilation, that exceeds the reference vessel diameter by 4 times [5].

The most common cause of CAAs is atherosclerosis, it is responsible for more than 50% of CAAs in adults in the Western world [6], this is the case of all our patients, but other causes have been described, For example Kawasaki disease which is characterized by an acute, self-limited vasculitis occurring in childhood, may lead to the development of CAAs in 15 to 25% of untreated children [7]. Other causes of CAAs include inflammatory arterial diseases, connective tissue disorders, hereditary collagen defects, coronary artery revascularization procedures, candidiasis, chest traumas, and primary hyperaldosteronism [1].

The histologic features of an atherosclerotic aneurysm include hyalinization, lipid deposition, disruption of intima and media, focal calcification and fibrosis, cholesterol crystals, intramural hemorrhage, and foreign-body giant-cell reaction to the atherosclerotic process. if one has the extension of this process into the media the risk of having an aneurysm formation increases. In areas of marked atherosclerosis, the media of the vessel wall is weakened, and there is a decrease in elasticity [2].

Complications from coronary artery aneurysms include thrombosis, embolism as highlighted in Case 1, arteriovenous fistulaization, vasospasm or rupture. In a post mortem study, Daoud et al reported the presence of thrombus in 7 of 10 patients with CAA [8], suggesting that chronic thrombosis may be common.

Until now, no consensus document or guidelines exist regarding the management of CAA, Many clinical questions remain regarding the management of CAA, particularly in the setting of ACS. Since the coincidence of CAA and ACS is a rare event, three patients in our series presented this coincidence.

A prospective, randomized clinical trial to compare pharmacologic and/or invasive management strategies is not likely logistically feasible. CAA treatment consists of medical management, surgical resection, and stent placement, however, the appropriate treatment for CAAs depends on the particular clinical situation. The medically conservative therapy generally consists of attempts to prevent thromboembolic complications in patients with aneurysmal arteries who are at increased thrombotic risk through administration of antiplatelet and anticoagulant medication [2]. The use of anticoagulants is based on the observations of thrombus formation in association with CAA and its distal embolization.

In patients with giant CAA or with other indications for chronic systemic anticoagulation, we recommend chronic therapy with aspirin 81 mg daily and warfarin to target an international normalized ratio (INR) of 2.0 - 3.0 [5].

Myler., *et al*. described a case of successful treatment of CAA with intracoronary thrombolytic (based on urokinase), IV heparin, and oral anticoagulation in a young woman with CAA secondary to presumed Kawasaki disease [9]. Other authors have documented angiographic thrombus resolution and excellent clinical outcomes with the use of intravenous eptifibatide, heparin, and aspirin and discharge with long-term dual-antiplatelet therapy that why all our patients are treated with dual-antiplatelet therapy.

The exclusion of the aneurysm with a PTFE-covered stent graft would eliminate sluggish flow through the (previously) aneurysmal segment, and would reduce the likelihood of aneurysm thrombosis, enlargement, or future rupture [10]. Bare-metal stent (BMS) implantations have also been used successfully in the treatment of CAA, yet are often used when PTFE-covered stent delivery is unsuccessful. Iakovou., et al. described 3 such cases where CAAs were treated with BMS [2]. There are also rare case reports of successful hybrid interventions using both PTFE-covered stent and BMS involving CAAs with bifurcation lesions and tapering CAAs. Other authors have documented successful treatment of CAA using coil embolization. Surgery may be indicated in the presence of aneurysms three to four times the original vessel diameter (giant CAA), involvement of the left main, bifurcation lesions, or multivessel involvement. Surgical strategies that have been described include aneurysm ligation, resection, marsupialization with interposition graft, and coronary artery bypass surgery. Another surgical Option that is frequently used is coronary artery bypass graft (CABG) followed by the ligation or resection of the aneurysm.

There is others treatment strategies to improve outcomes in vasculitis-induced CAA involve the use of immunosuppressive therapy to abate the underlying inflammatory process [2].

Conclusion

CAA is often asymptomatic and discovered during another angiography cardiac exploration. Atherosclerosis is the most common basis of formation of coronary aneurysm.

Many clinical questions remain regarding the management of CAA, particularly in the setting of ACS. CAA treatment consists of medical management, surgical resection, and stent placement; however, the appropriate treatment for CAAs is controversial and depends on the particular clinical situation.

Acknowledgement

Radi Fatima Zohra and El Hattab Fatima Zahra these authors participated equitably in this work

Conflict of Interests

The author(s) declare that they have no competing interests.

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Volume 5 Issue 7 July 2018