

CASE REPORT

ADVANCED

CLINICAL CASE

Management of a Mycotic Right Coronary Artery Aneurysm With Contained Rupture



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ABSTRACT

Infected coronary artery aneurysm is a rare complication of bacteremia with significant risk of mortality. We describe a case where contained rupture had caused purulent pericarditis and an alternative surgical approach to management was required as aortocoronary bypass grafting was unfeasible. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:694–698) © 2022 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 61-year-old man with a 2-month history of flu-like illness and exertional angina presented to the emergency department. He reported anorexia, weight loss, fevers, productive cough, and postural syncope. Examination showed a thin, unwell-looking man without evidence of heart failure or peripheral stigmata of infective endocarditis (IE). Auscultation revealed no murmur, but reduced breath sounds to the left lower and mid-zones. His vital signs were as follows: respiratory rate 22 breaths/min, oxygen

saturation 96% on room air, heart rate 109 beats/min with sinus tachycardia, and blood pressure 165/79 mm Hg. The patient was afebrile. An electrocardiogram showed inferior ST-segment elevation with no reciprocal changes; his initial troponins were elevated but downtrending (429 to 381 ng/L). The leukocyte count (15.7×10^9 cells/L) and C-reactive protein (267 mg/L) were elevated.

MEDICAL HISTORY

His medical history was significant for severe eczema with prurigo nodules, chronic kidney disease, hypertension, diabetes mellitus, and hypercholesterolemia. He did not describe intravenous drug use and had quit smoking 11 years prior.

DIFFERENTIAL DIAGNOSIS

The patient received a diagnosis of community-acquired pneumonia and non-ST-segment elevation myocardial infarction.

LEARNING OBJECTIVES

- To be able to make a diagnosis of infected coronary artery aneurysm with multimodality imaging.
- To consider an alternative approach to surgical management when aortocoronary bypass grafting is not possible.

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INVESTIGATIONS

Transthoracic echocardiography showed a large circumferential pericardial effusion with fibrinous appearance and a thickened myocardium. There were significant mitral and tricuspid inflow respiratory changes but no evidence of chamber collapse, consistent with an effusive-constrictive physiology without cardiac tamponade (Figure 1). A transesophageal echocardiogram showed mild mitral regurgitation without evidence of IE. A gallium scan demonstrated uptake within the pericardial effusion, most marked along the atrioventricular groove (Figure 2). Cardiac magnetic resonance (CMR) showed a proximal right coronary artery (RCA) aneurysm with adjacent collection, concerning for contained rupture, causing compression of the right ventricle (Figure 3). Coronary angiography was initially delayed because of renal impairment and persistent positive blood cultures, but confirmed a 40-mm RCA aneurysm (Figure 4).

MANAGEMENT

The patient was administered empiric antibiotics, dual antiplatelet therapy, and a 48-hour heparin infusion. Antibiotics were changed to intravenous vancomycin after methicillin-resistant *Staphylococcus aureus* was isolated from blood cultures.

Four weeks after presentation his condition deteriorated as a result of cardiac tamponade, and he underwent urgent surgery. After sternotomy, it was apparent that the infective component had caused the pericardium to become densely adherent to the underlying myocardium. Cardiopulmonary bypass was established peripherally, the aorta was dissected free, cross-clamping was applied, and antegrade cardioplegia was given via the aortic root. The thickened pericardium was incised, and 50 mL purulent fluid was drained. A limited pericardiectomy was performed anteriorly, but attempts to extend this were unsuccessful because of fusion, and consequently the RCA and distal branches were unable to be identified. A decision was made to resect the aneurysm and patch the defect. The infected phlegmon was completely debrided to reveal the origin of the mycotic coronary artery aneurysm (MCAA): a small defect in a 15-mm segment of heavily calcified atheroma at the crux of the RCA. This friable calcified tissue was unable to hold sutures, so the vessel was deroofed via a limited resection to expose normal arterial wall with subsequent reconstruction of the RCA wall with a vein patch (Figure 5). The patient was successfully weaned from bypass and transferred to the intensive care unit. He spent a total of 13 days in the intensive care unit and 2 days in the ward before being transferred to inpatient rehabilitation.

ABBREVIATIONS AND ACRONYMS

CMR = cardiac magnetic resonance

IE = infective endocarditis

MCAA = mycotic coronary artery aneurysm

RCA = right coronary artery

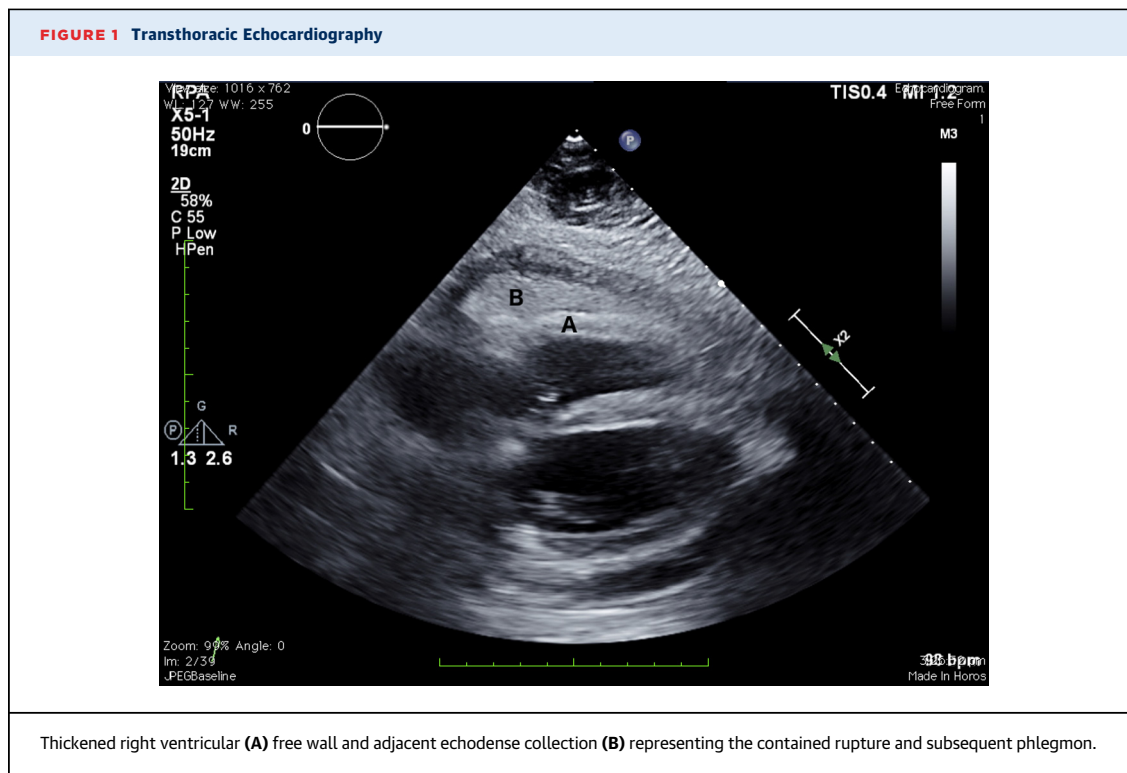
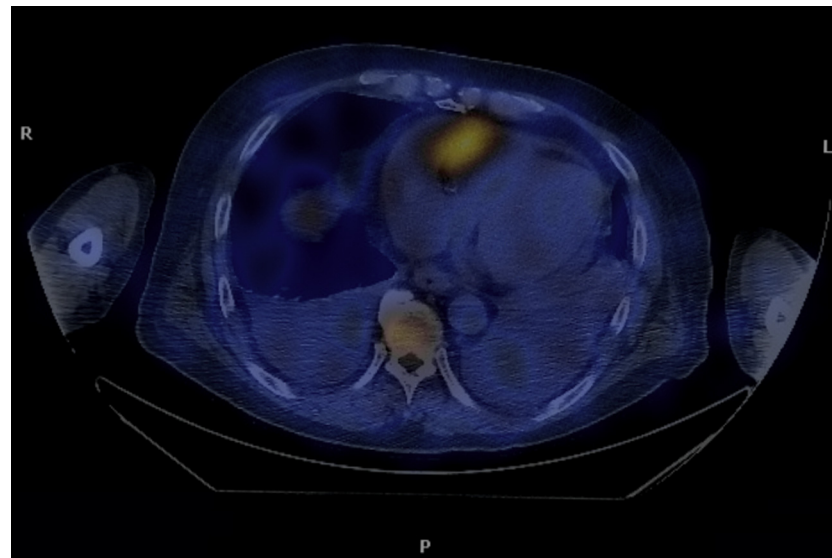


FIGURE 2 Gallium Scan

Radionuclide tracer uptake within the mycotic coronary artery aneurysm.

DISCUSSION

Coronary artery aneurysms can be congenital or acquired. Kawasaki disease is the most common cause of acquired coronary artery aneurysm in children, and atherosclerosis is the leading cause in adults.¹ Rarely, infected coronary artery aneurysm can occur in the setting of IE or septicemia.^{2,3} MCAA represents <3% of all coronary artery aneurysms and occurs in <0.5% cases of IE.^{3,4}

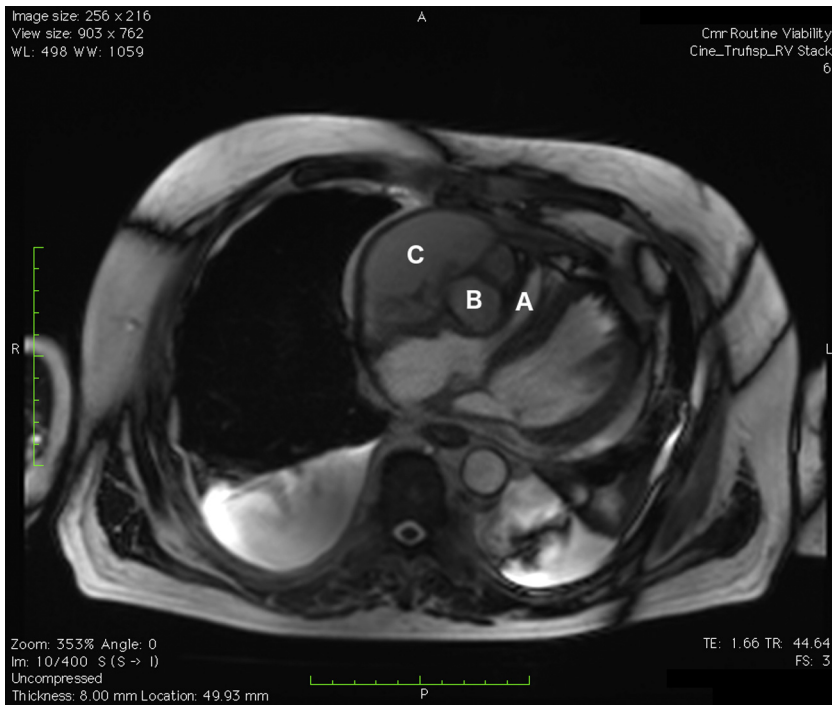
Proposed mechanisms for the pathogenesis of MCAA in IE and septicemia include the following: 1) embolic occlusion and sterile infarction of the vasa vasorum; 2) direct bacterial invasion of the arterial wall during septicemia; and 3) injury due to immune complex deposition.³⁻⁷ *Staphylococcus aureus* is responsible for the majority of MCAAs (53%).⁸

Autopsy studies have shown that MCAAs are pseudoaneurysms that result from destruction of the external elastic lamina with subsequent expansion and wall thinning.⁹ The natural history of untreated MCAA is that of irreversible dilatation and eventual rupture.⁴ Aside from rupture, potential complications include thrombosis with occlusion, distal embolization, fistulization, cardiac tamponade, myocardial ischemia, and infarction.^{1,7,8} In keeping with this, mortality rates ranging from 40% to 60% have been reported in the literature.^{3,10}

Patients with MCAA frequently present with nonspecific symptoms such as fever, anorexia, and lethargy. Progressive shortness of breath and angina are commonly reported in the literature, and a murmur may indicate concomitant valvular IE.^{3,8} Owing to the nonspecificity of the features, clinicians should have a high index of suspicion for endovascular infection in patients with persistent positive blood cultures despite appropriate antibiotic therapy, and MCAA should be considered in these patients, especially when the result of echocardiography is negative for IE.

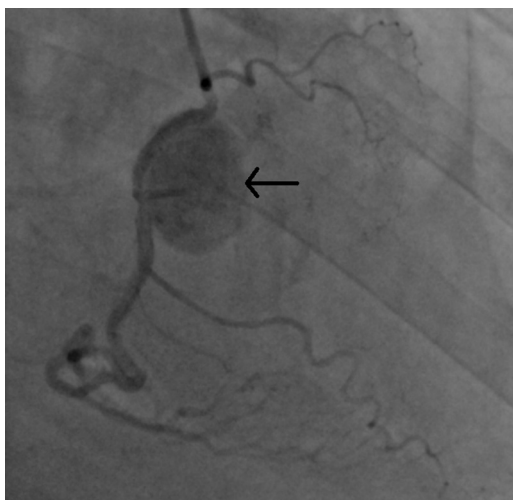
Coronary angiography is the definitive imaging technique for diagnosing MCAA but may be omitted in patients without angina or cardiac risk factors.³ Computed tomographic coronary angiography (CTCA) is a less invasive alternative to coronary angiography and is considered to be diagnostically equivalent, with sensitivity and specificity of 92% to 96% and 93% to 100%, respectively,³ but it still requires administration of intravenous contrast material. Echocardiography is frequently performed as a first-line investigation for the exclusion of IE but is generally limited to detecting ostial or proximal coronary artery aneurysms.³ CMR is a noninvasive imaging modality that has the benefit of both defining the anatomy of the coronary artery aneurysm and providing detailed information about the surrounding cardiac

FIGURE 3 Cardiac Magnetic Resonance



Right ventricular (A) compression caused by the mycotic coronary artery aneurysm (B) and contained pericardial collection (C).

FIGURE 4 Coronary Angiogram



Aneurysm (black arrow) arising from the proximal right coronary artery.

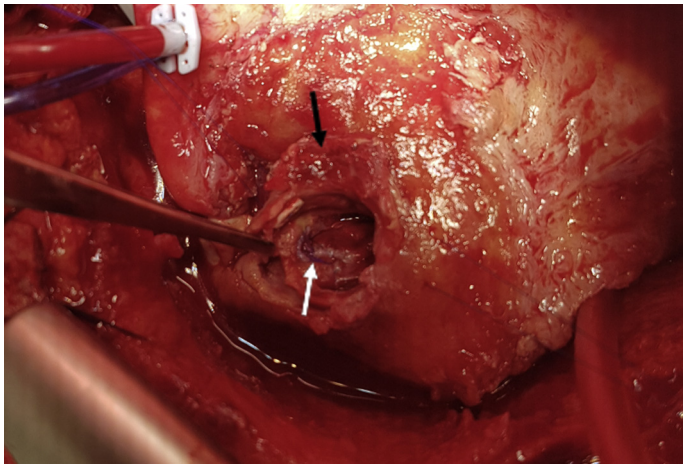
and pericardial structures⁸ without requiring intravenous contrast material.

MCAAs are exceedingly rare, and the relevant current literature consists of <100 case reports. Consequently, there are no guidelines to direct investigation and management. Generally, the use of covered stents and coiling has been avoided because of the risk of bacterial colonization and ongoing infection.³ Considering the inherent risk of rupture and late coronary complications, most case reports describe surgical management with aneurysmal resection, ligation, and distal aortocoronary bypass grafting.

CONCLUSIONS

Infected coronary artery aneurysms in the absence of recent stenting are rare, and clinicians need to maintain a high degree of suspicion in the setting of persistent bacteremia, particularly when there is no echocardiographic evidence of IE. Although coronary angiography is the definitive diagnostic test, CTCA or CMR may be useful adjuncts and can provide further

FIGURE 5 Intraoperative Image of Repaired Aneurysm



Aneurysm sac (**black arrow**) has been incised and the coronary artery has been patch repaired with saphenous vein (**white arrow**).

information regarding the aneurysm wall and adjacent pericardium. Given the risk of rupture and the high mortality rate, surgical aneurysmal resection, ligation, and aortocoronary bypass are best performed once bacteremia has cleared, if the patient remains in hemodynamically stable condition. In the setting of a diffusely adherent pericardium with unidentifiable distal arteries, we have shown reconstruction of the coronary artery lumen with use of a vein patch after aggressive debridement to be an effective alternative.

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