

MINI-FOCUS ISSUE: CORONARIES

ADVANCED

CASE REPORT: CLINICAL CASE

Multimodal Imaging of Post-Stenting Mycotic Coronary Pseudoaneurysm Complicated by Device Fracture and Myocardial Abscess



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ABSTRACT

Mycotic coronary aneurysm and pseudoaneurysm are rare infective complications of percutaneous coronary interventions, associated with poor prognosis. Multimodality imaging is recommended to achieve a correct diagnosis. We present a case of post-stenting mycotic coronary pseudoaneurysm complicated by myocardial abscess in which we used different imaging tools, each carrying additional information. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2020;2:1667-70) © 2020 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/>).

A 70-year-old man was admitted to our unit for an episode of typical chest pain, which increased at rest. At our assessment there were no constitutional symptoms and hemodynamic parameters were normal. Electrocardiogram (ECG) did not show significant alterations, but cardiac enzymes were elevated (troponin I 5,060 ng/ml, normal value <0.045; creatine kinase-myocardial

band 9.30 ng/ml, normal range 1 to 3.6). A transthoracic echocardiogram (TTE) showed mild pericardial effusion with mild impairment of left ventricular ejection fraction (50%) due to anterior wall hypokinesia. In suspicion of acute coronary syndrome, the patient underwent coronary angiography that revealed a critical calcified stenosis of the mid left anterior descending artery (LAD), treated using percutaneous coronary intervention (PCI) and implantation of 3 overlapping drug-eluting stents (DES) (**Figures 1A to 1B**). In detail, the procedure was carried out with successful pre-dilatation of the proximal-mid LAD segment (total diseased segment's length 35 mm, with 3.0 mm and 2.5 mm proximal and distal reference vessel diameters, respectively), with fully expanded 2.0 mm and 2.5 mm noncompliant balloons. A 2.5 × 15 mm DES (Resolute Onyx, Medtronic,

LEARNING OBJECTIVES

- Multimodality imaging is recommended to achieve a diagnosis of post-stenting mycotic coronary pseudoaneurysm.
- The mortality rate of post-stenting mycotic coronary pseudoaneurysm is high despite combined medical and surgical therapy.

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ABBREVIATIONS AND ACRONYMS

CMR = cardiac magnetic resonance

cPSA = coronary pseudoaneurysm

DES = drug-eluting stents

ECG = electrocardiogram

LAD = left anterior descending artery

PCI = percutaneous-coronary-intervention

TTE = trans-thoracic echocardiogram

Minneapolis, Minnesota) was distally implanted followed by a 2.75 × 22 mm Resolute Onyx delivered in overlap in the proximal segment. Due to the suboptimal angiographic result (plaque shift), a third 2.5 × 12 mm Resolute Onyx was distally implanted in overlap. Proximal and distal post-dilatations were performed with a 3.0-mm and a 2.75-mm noncomplaint balloon, respectively. Final Thrombolysis In Myocardial Infarction flow grade 3 was achieved, without evidence of coronary dissection. The day after, the patient presented with fever (temperature 38.5°C) and cough and 48 h

after PCI he developed episodes of shortness of breath and atypical chest pain. C-reactive protein (27.1 mg/dl, normal value <0.3 mg/dl) as well troponin I (7,320 ng/ml) values were high. Empirical β-lactam antibiotic treatment was started.

PAST MEDICAL HISTORY

History included hypertension, type 2 diabetes mellitus, dyslipidemia, cocaine misuse, chronic idiopathic anemia, and thrombocytopenia ($60 \times 10^3/\mu\text{l}$, normal range, 130 to $400 \times 10^3/\mu\text{l}$).

DIFFERENTIAL DIAGNOSIS

The differential diagnosis was acute myo-pericarditis, pneumonia, and pleurisy.

INVESTIGATIONS

Diffuse ST-segment elevation (pericarditis-like) was detected at ECG, which was performed 72 h after PCI. Pericardial effusion enlargement with further left ventricular ejection fraction reduction (45%), in the absence of active valve endocarditis, were documented at a new TTE assessment. To exclude myo-pericarditis, 96 h after PCI, a cardiac magnetic resonance (CMR) was performed: severe non-tamponade circumferential pericardial effusion was confirmed with the surprising evidence of a coronary pseudoaneurysm (cPSA) at the level of a previously treated mid-LAD segment, with a possible stent discontinuity (Figures 2A to 2C, Video 1). Blood cultures resulted positive for *Staphylococcus aureus*.

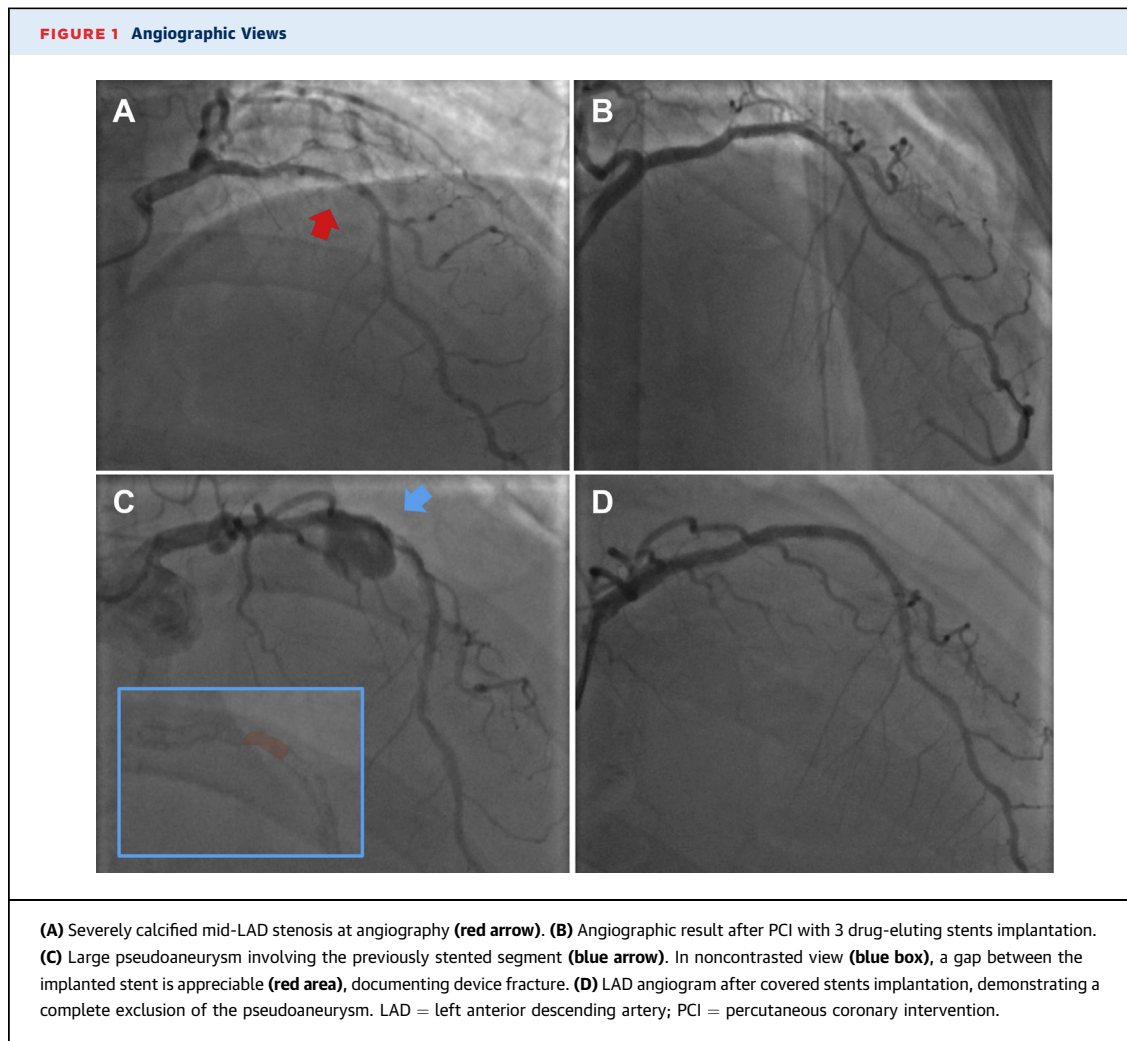
MANAGEMENT

Intravenous antibiogram-guided therapy with oxacillin was started. On the basis of clinical,

laboratory, and imaging findings, a diagnosis of post-stenting mycotic (infected) cPSA was formulated. Our multidisciplinary heart team judged the patient at very high surgical risk and a percutaneous treatment strategy was chosen to prevent the risk of PSA expansion, resulting in rupture and cardiac tamponade. The following coronary angiography confirmed the large mid-LAD PSA, showing fracture of overlapping implanted DES (Figure 1C, Video 2). PCI with a 3.0 × 18 mm covered stent (BeGraft; Bentley, Hechingen, Germany) implantation (inflated at maximum 12 atm) was performed. However, for the persistence of pseudoaneurysm filling, the other 2 3.0 × 18 mm BeGraft covered stents were placed proximally and distally with a large overlap area with the previous one (maximum inflation pressures 12 atm), documenting full exclusion of PSA, without evidence of leaks (Figure 1D). The PSA infective nature was confirmed using PET, which also documented an increased radiotracer uptake of the mid-left ventricular anterolateral wall at the stented segment level, compatible with a myocardial abscess (Figure 3A). TTE also detected an irregular and hypoechoic area within the left ventricular myocardium (Figure 3B). A multi-slice computed tomography scan was planned to assess the feasibility of abscess surgical drainage. However, a multi-slice computed tomography scan confirmed the cPSA exclusion associated with an extended inflammatory mass deeply located within the myocardium, making a surgical excision not feasible (Figure 3C). Conservative antibiotic treatment was administered, but, despite an initial promising response, the patient died 3 months later due to sepsis.

DISCUSSION

Mycotic coronary aneurysm and pseudoaneurysm are a rare infective disease of the arterial vessel walls. The development could be linked to the presence of an infective endocarditis or could represent a primary infection at the site of an implanted coronary stent (1). Bacteria, particularly *S aureus*, are the most common etiological agents (2). Although mycotic coronary aneurysm onset is usually subacute, time to presentation can be extremely variable, with several cases (as in our patient) reported to occur even in the early days after PCI (3). Diagnosis is challenging because symptoms can be subtle and there is not a “one-stop-shop” imaging test able to provide complete information to reach the diagnosis (4). Morbidity and mortality are high, especially in the context of pseudoaneurysm,



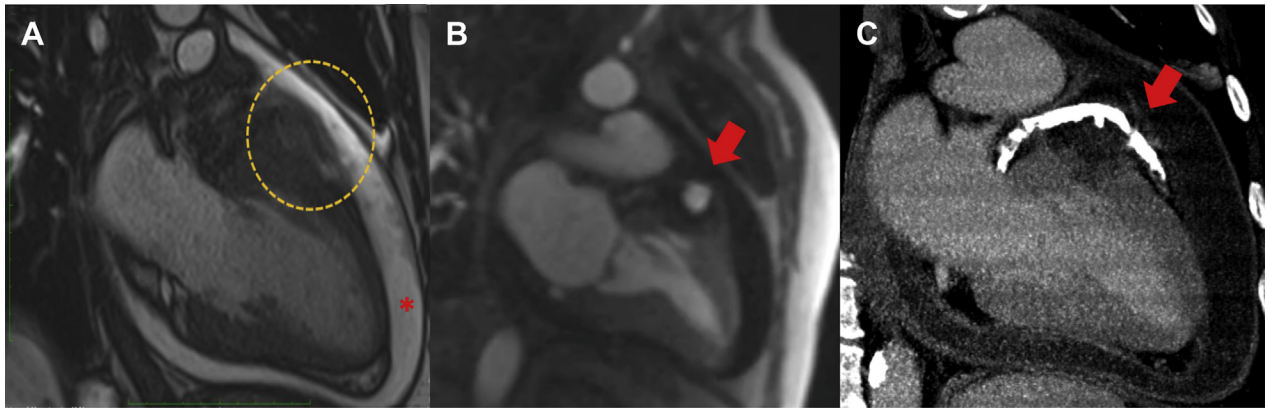
which carries an increased risk of rupture, or in the case of infectious dissemination, involving the myocardium and pericardium. Prompt treatment is required, although, to date, little evidence concerning the optimal strategy is available and the mortality rate remains high independent from the combined efforts of medical and surgical therapy (2). In the presented case, surgical correction was excluded due to the prohibitive pre-operative mortality risk. For this reason, we decided to treat the patient percutaneously at least to minimize the risk of cPSA rupture (a well-known fatal consequence). Antibiotic treatment was administered to control infections. However, we observed a dismal prognosis, which culminated with the patient's death.

CONCLUSIONS

In patients with suspicious of mycotic coronary aneurysm or pseudoaneurysm presenting with a recent history of PCI associated with clinical and laboratory findings of current infection, a multi-modality imaging strategy (comprehensive of invasive and noninvasive tools) is strongly recommended and plays a pivotal role in confirming the diagnosis.

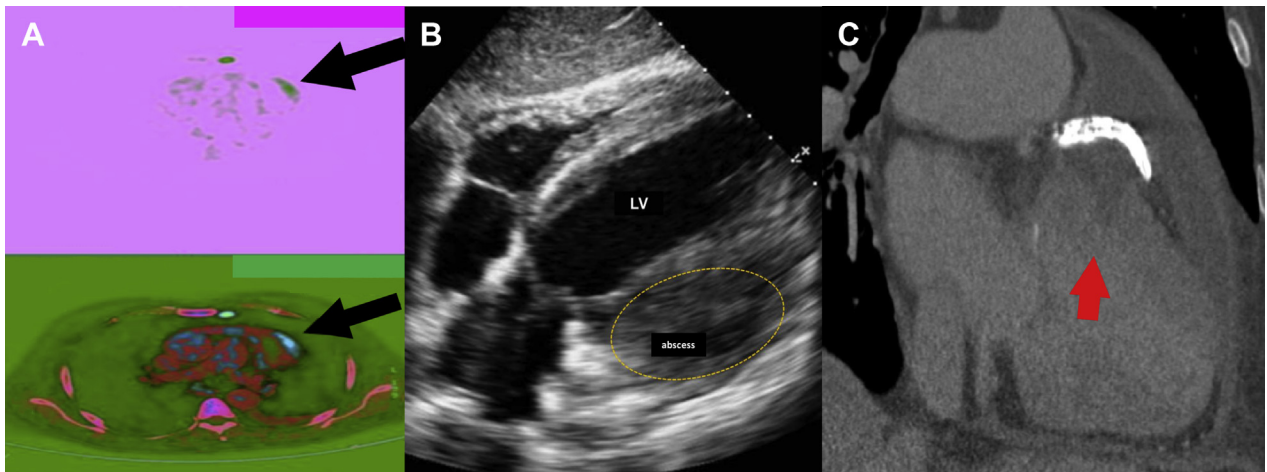
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FIGURE 2 Multimodal Imaging of Coronary Pseudoaneurysm



(A) Cine steady-state free precession 2-chamber CMR view confirmed severe (31 mm) circumferential pericardial effusion (red asterisk) and the presence of pathological signal in the left ventricle anterior wall (yellow line). (B) Real-time cine CMR frame of the large (25 x 17 mm) mid-LAD dilatation. The image is compatible with a coronary pseudoaneurysm. (C) Noncontrasted CMR frame documenting a discontinuity (fracture) of previously implanted stents in LAD (red arrow). CMR = cardiac magnetic resonance; other abbreviation as in Figure 1.

FIGURE 3 Multimodal Imaging of Myocardial Abscess



(A) Pseudoaneurysm showed increased radiotracer uptake at positron emission tomography. This finding is compatible with its infective nature. Hypermetabolism involved the adjacent anterolateral myocardial wall, raising the suspicion of a myocardial abscess. (B) Echocardiographic appearance of a myocardial abscess as an irregular and hypoechoic area inside the left ventricular myocardium (yellow circle). (C) Multi-slice computed tomography confirmed pseudoaneurysm exclusion after covered stents implantation. Also, the extended inflammatory mass deeply located within the myocardium is visible (red arrow).

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KEY WORDS mycotic coronary aneurysm, myocardial abscess, staphylococcal infections, stent fracture

APPENDIX For supplemental videos, please see the online version of this paper.