

## CASE REPORT

### CLINICAL CASE

# Late Presentation of Right Coronary Artery Stent Infection as Left Empyema and Pleuropericardial Fistula



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### ABSTRACT

Coronary stent infection (CSI) is a rare but potentially life-threatening disease, the incidence of which has been on a rise over the past 2 decades. Surgery seems the treatment of choice, providing a definitive diagnosis of CSI and removing the source of infection, repairing aneurysms, and providing bypass vascular grafts if feasible. Thorough evaluation and a multidisciplinary approach lead to detection and a better outcome. We report a patient who presented with symptoms of heart failure and shock, who received a diagnosis of CSI complicated by empyema with pleuropericardial fistula. He was treated by stent removal and decortication. (J Am Coll Cardiol Case Rep 2023;28:102117) © 2023 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/>).

Coronary stent infection (CSI) is a rare but potentially life-threatening disease, witnessing a rise in incidence over the past decade, possibly because of aggressive invasive cardiologic procedures, the advent of drug-eluting stents, and improved modalities of diagnosis. Early recognition and institution of appropriate medical and surgical therapy is vital for patient survival. Despite early detection and optimal management, CSI carries high morbidity and mortality.<sup>1</sup> We report a late-presenting case of right coronary artery (RCA) stent infection

with left empyema and pleuropericardial fistula, which is a very rare presentation (**Central Illustration**).

### HISTORY OF PRESENTATION

A 56-year-old man with diabetes and hypertension presented with a description of chest pain, breathlessness, and fever for 3 weeks. His vital signs were as follows: blood pressure 100/56 mm Hg, pulse 90 beats/min, and oxygen saturation 93% on room air. Physical examination revealed decreased breath sounds on the left side of the chest and a contralateral mediastinal shift. His heart sounds were normal, and no murmur was appreciated.

### LEARNING OBJECTIVES

- To describe the rare presentation and surgical approach for the management of coronary stent infection.
- To highlight the importance of a multidisciplinary approach for the management of complicated coronary stent infections.

### PAST MEDICAL HISTORY

The patient was known to have coronary artery disease and had undergone percutaneous transluminal coronary angioplasty and placement of a stent to the RCA 7 years earlier, followed by repeated angioplasty

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**ABBREVIATIONS  
AND ACRONYMS****CSI** = coronary stent infection**RCA** = right coronary artery

15 days later because of stent occlusion; he had presented with ventricular tachycardia at that time. Three months earlier, he had presented with monomorphic ventricular tachycardia and had undergone placement of an automated implantable cardioverter defibrillator. He was also evaluated for coronary artery disease and was observed to have double vessel disease with complete occlusion of the RCA and a subcritical lesion in the ramus artery (Figure 1).

**DIFFERENTIAL DIAGNOSIS**

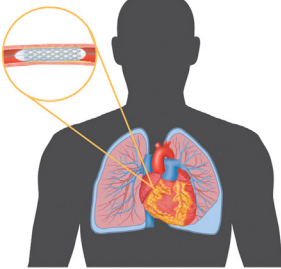


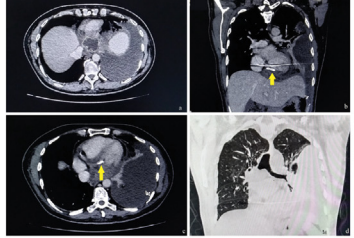

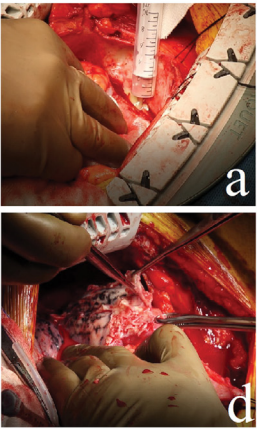
Septic shock/cardiogenic shock seemed to be the possible differential diagnosis secondary to pleural

collection. Empyema could be another differential diagnosis with this presentation.

**INVESTIGATIONS**

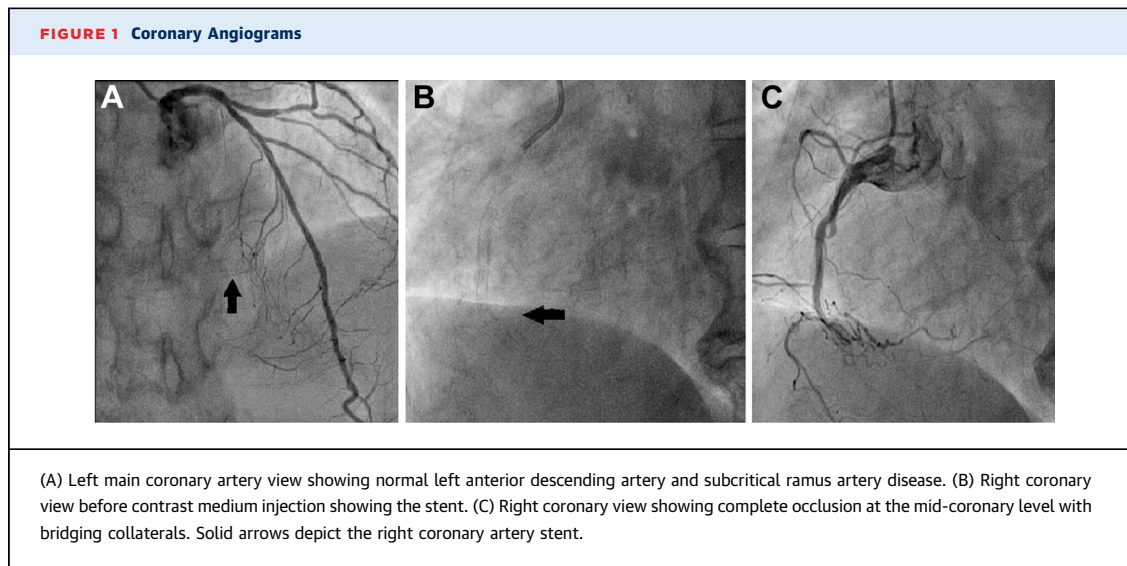
At his current admission, the patient presented with heart failure and shock, for which his condition was stabilized and evaluated. Blood profile showed the following: hemoglobin 10.3 g/dL, white blood count 19,410/ $\mu$ L, serum creatinine 0.7 mg/dL, and C-reactive protein 167.7 mg/dL. He was given meropenem 2 g orally twice daily and teicoplanin 800 mg orally once daily in consultation with an infectious disease specialist. High-resolution computed tomography showed a 57  $\times$  56  $\times$  21 mm well-defined cystic dense

**CENTRAL ILLUSTRATION Late Presentation of Coronary Stent Infection**

Presentation	Workup	Management
 <p>56-year-old male with history of diabetes, hypertension, coronary stent presented with chest pain, breathlessness, and fever for 3 weeks</p>  <ul style="list-style-type: none"> <li>BP 100/56 mm Hg</li> <li>HR 90 beats/min</li> <li>O<sub>2</sub> sat 93% on room air</li> <li>Decreased breath sounds on left side of chest and contralateral mediastinal shift</li> </ul>	<p><b>Labs</b></p>  <ul style="list-style-type: none"> <li>WBC 19,410/<math>\mu</math>L</li> <li>CRP 167.7 mg/dl</li> <li>Blood culture negative</li> </ul> <p><b>CT</b></p> <ul style="list-style-type: none"> <li>57x56x21 size well-defined cystic density lesion with irregular enhancing wall in the inferior aspect of heart with cardiac stent</li> <li>Communication of abscess cavity to the left pleural cavity</li> </ul>  <ul style="list-style-type: none"> <li>LV ejection fraction 45%</li> <li>Hypokinesia of inferior wall</li> </ul>	 <p>Meropenem and Teicoplanin</p> <ul style="list-style-type: none"> <li>Inferior pericardial cavity filled with pus with stent lying freely in it</li> <li>Pleura cavity with pus with pleuropericardial fistula</li> </ul>  <ul style="list-style-type: none"> <li>Decortication of pleural and pericardial cavity</li> <li>Stent removed, bypass unable to be performed</li> </ul>

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lesion with an irregular enhancing wall in the inferior aspect of the heart with a cardiac stent in it (Figures 2A to 2C) and also showed communication of an abscess cavity to the left pleural cavity. The chest cavity showed massive collapse of the left lung with hydropneumothorax (Figure 2D). Echocardiography showed left ventricle systolic function of 45%, hypokinesia of the inferior wall, and reduced left ventricular compliance. Blood samples were sent for aerobic and anaerobic culture and sensitivity tests, but the results were negative for both.

### MANAGEMENT

The patient was prepared for surgery: coronary stent removal and lung decortication. Inasmuch as the stent was lying freely in the cavity and there was a high possibility of involvement of the inferior vena cava area, we decided to gain percutaneous venous access (femoral venous) for cardiopulmonary bypass support. The pericardium was opened, and flimsy adhesions over the anterior and lateral parts of the pericardium were removed. The inferior portion was approached through careful dissection over the diaphragmatic surface. The cavity was opened and was found to be filled with pus, with the stent lying freely in it (Figures 3A to 3C). The whole of the cavity was evacuated, and both stent and tissue were sent for culture and sensitivity testing. The RCA was completely disfigured, and the posterior descending artery was very small, so revascularization was not done. The pleural cavity was approached, and the left lung was found completely collapsed with pus flakes present all over it (Figure 3D). Decortication was

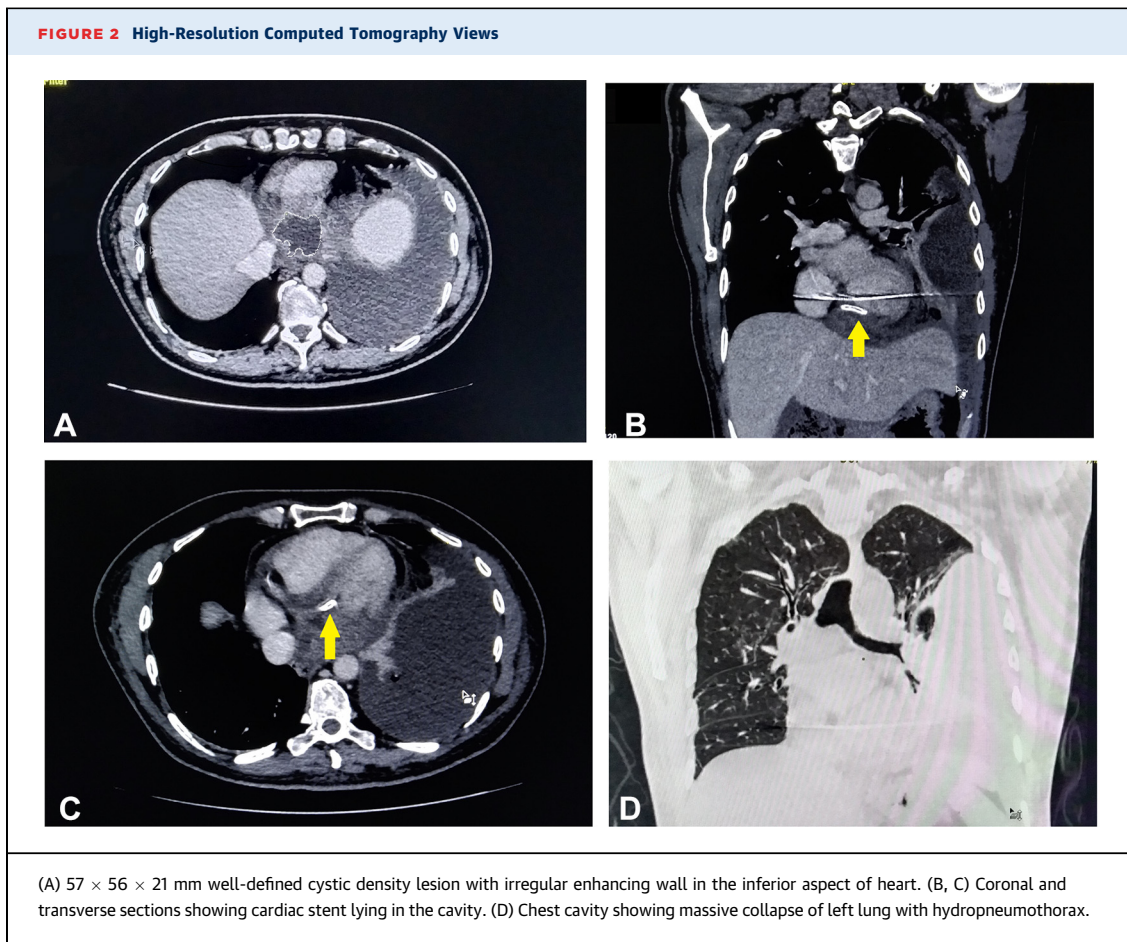
performed, and samples were taken for culture and sensitivity testing. Both the pleural and the pericardial cavities were washed with betadine solution for 2 minutes. The lungs were expanded with positive pressure to recruit the collapsed portions. A chest x-ray showed marked improvement in the lung fields (Figure 4).

Immediate postoperative echocardiography showed normal right ventricular function and left ventricular systolic function of 50% (Video 1). The patient was extubated on postoperative day 1. Blood cultures did not reveal any growth, but the inflammatory markers showed significant reduction. The patient continued to be prescribed meropenem 2 g orally twice daily and teicoplanin 800 mg orally once daily for 7 weeks. Echocardiography before his discharge showed normal right ventricular function and normal ventricular function.

### DISCUSSION

Intravascular metal stent infections are rare but serious complications, often leading to emergency surgery. The first case of coronary stent infection was reported in 1996 by Leroy et al.<sup>2</sup> Fever and chest pain constitute the most common presentation, followed by breathlessness and cardiogenic shock. The onset of symptoms usually occurs within the first week after stent implantation, but late presentation has also been reported.<sup>3,4</sup>

Blood culture and coronary angiography are the most preferred methods of diagnosis. However, positron emission tomography scan and cardiac magnetic resonance are also helpful in delineating



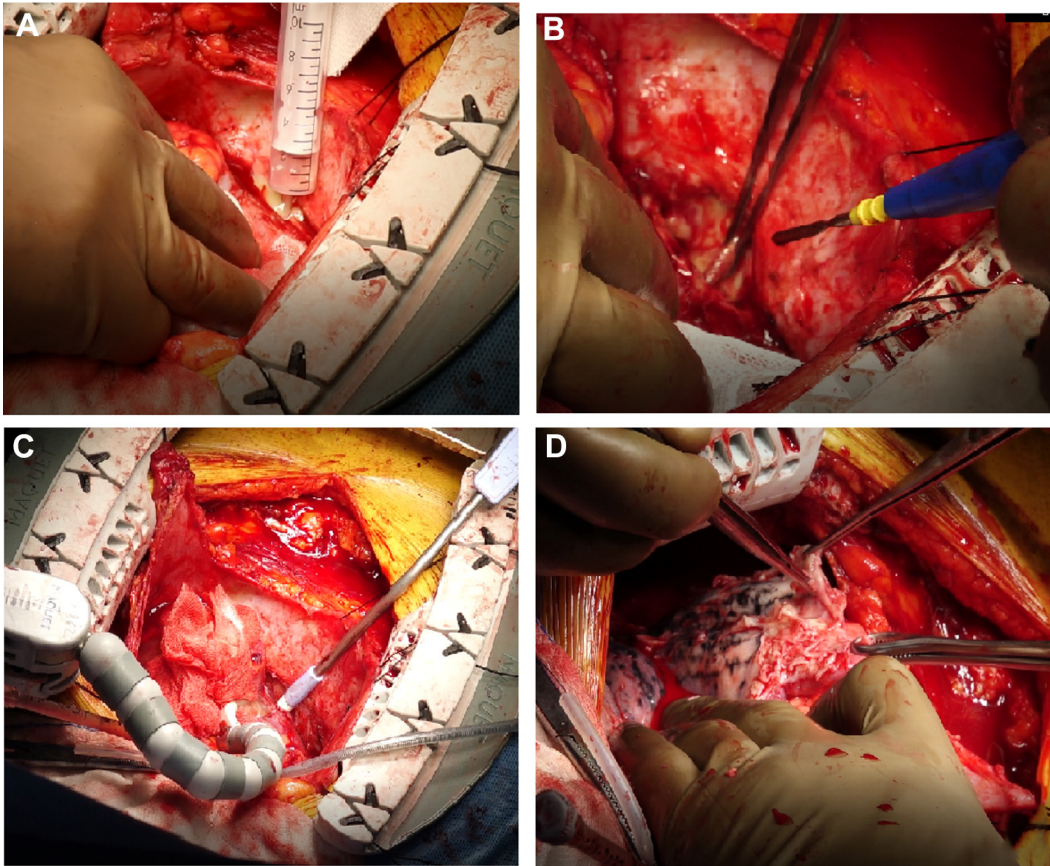
the extent of pathologic changes aiding the surgical approach to them. Of all reported cases and pathogens identified, Staphylococci were the most prevalent pathogens, of which *Staphylococcus aureus* was the most common culprit, followed by methicillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Escherichia coli*, *Enterobacter cloacae*, and *Actinomyces oris*.<sup>5-7</sup> Nearly two-thirds of patients have aneurysms of the coronary artery (true and pseudoaneurysm) alone or in combination with in-stent restenosis, and one-third have vessel occlusion. Coronary-cameral fistula, coronary perforation, delayed migration of stent, and soft-tissue density collection have also been reported.<sup>1,8</sup>

CSI should be treated with a combination of antibiotics and surgery. Surgery is the logical treatment of choice because it can provide a definitive diagnosis of CSI while also removing the infection source, repairing aneurysms, and providing bypass vascular grafts if feasible. To our knowledge, CSI with empyema and pleuropericardial fistula has not been previously reported. In this case, we decided to remove the

infected areas of pathologic change and to perform decortication of the lungs. Given that the stent was lying freely in the cavity, a percutaneous venous cannulation approach was taken.

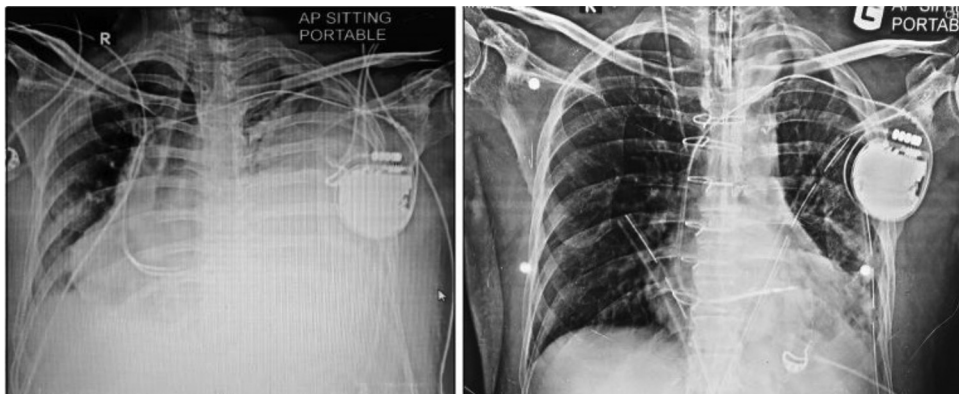
In our case, the patient presented in a very sick condition, possibly sepsis, although we did not receive positive culture results either preoperatively or postoperatively, but we observed a reduction in markers as well as clinical improvement after removal of the stent and pus. A prominent finding in our case was dense adhesions near the right coronary artery territory and the stent lying freely in the cavity, indicating the chronicity of disease and delayed migration of the stent, but the pus flakes present over the pleural surface seemed recent. Another possibility could have been the intervention performed 3 months earlier when the patient underwent placement of an automated implantable cardioverter defibrillator, indicating the odds of some unnoticed puncture of the right ventricular wall leading to a concealed hematoma that became infected, leading to a pleuropericardial fistula and empyema.

**FIGURE 3** Surgical Images



(A) Pus in the inferior cardiac region. (B, C) Large pus cavity and stent lying freely in it. (D) Completely collapsed left lung with pus flakes present all over it.

**FIGURE 4** Chest X-Ray Views



Comparison of presurgical view (left) with postsurgical view (right) indicating marked improvement.

## FOLLOW-UP

At the 1-month follow-up visit, patient was in clinically stable condition, with significant improvement, healing of the sternal wound, and no signs of sepsis. Echocardiography at 3 months showed a left ventricular ejection fraction of 45% and no pericardial collection. A chest x-ray showed clear lung fields and no collection.

## CONCLUSIONS

CSI is a spurious infection, which can involve myocardium, endocardium, and nearby structures and can extend even up to the pleural cavity. Besides its common usual presentation of aneurysms and

pseudoaneurysm, it can also present as empyema and fistula. Thorough evaluation and a multidisciplinary approach involving cardiologists, microbiologists, cardiac radiologists, and cardiothoracic surgeons, with the institution of appropriate medical and surgical therapy, can lead to detection and better outcome.

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**KEY WORDS** coronary stent infection, empyema, pleuropericardial fistula, right coronary artery stent

**APPENDIX** For a supplemental video, please see the online version of this paper.