

# The Difficulties of Diagnosing a Rare Entity in a Common Situation

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**Abstract:** Acute purulent pericarditis is rare and more prevalent in the pre-antibiotic era with high mortality, around 40% despite optimal treatment. The diagnosis can be difficult, requiring the practice of a pericardiocentesis in cases with a high index of suspicion. When such a rare entity coincides with another one more frequently the diagnosis can become tricky. We present the case of a man with a previous thoracic surgery who was admitted due to an ST Elevation Myocardial Infarction (STEMI) and was finally diagnosed with Methicillin Susceptible Staphylococcus Aureus (MSSA) purulent pericarditis requiring cardiac surgery. The main difficulty, in this case, was the differentiation between hemopericardium and purulent pericardium. Despite the initial difficulties, the systematic study of febrile syndrome and bacteremia allowed reaching the final diagnosis.

**Keywords:** Bacteriemia, Purulent Pericarditis, Hemopericardium, Constrictive Pericarditis

## Introduction

Acute purulent pericarditis is rare and more prevalent in the pre-antibiotic era with high mortality, around 40% despite optimal treatment. The diagnosis can be difficult, requiring the practice of a pericardiocentesis in cases with a high index of suspicion. Occasionally the diagnosis is reached at necropsy. When such a rare entity coincides with another one more frequently the diagnosis can become tricky. We present the case of a man with STEMI and pericardial effusion which was initially interpreted as a possible cardiac rupture but finally the diagnosis of purulent pericarditis was reached.

## Case Presentation

We present a 62-year-old man with a history of hypertension, dyslipidemia, type 2 diabetes, and ischemic heart disease. On January 2018 a quadruple coronary artery bypass has performed. In the immediate postoperative period, he presented a severe pericardial effusion with a constriction that resolved with corticosteroids.

In February 2021, the patient was admitted to the emergency room for acute, oppressive chest pain

radiating to the left arm. Also, in the last 2 weeks, he had reported episodes of intermittent chest pain accompanied by a low-grade fever and chills. The patient denied cough, sputum, dysuria, or diarrhea and only reported that 2 weeks earlier he had had a paronychia that had resolved. In the physical examination, the patient was normotensive at 125/69 mmHg, tachycardic at 102 bpm, and tachypneic at 24 bpm with blood oxygen saturation of 98% on room air and afebrile. Heart tones were rhythmic without murmurs, pulmonary auscultation showed preserved vesicular murmur without rales and he presented jugular venous distention. The rest of the examination revealed no pathological signs. The 12-lead Electrocardiogram (ECG) revealed sinus rhythm at 100 bpm with ST elevation in leads DII, DIII, aVF, V5R-V6R with specular descent in the DI and aVL leads. A Transthoracic Echocardiography (TTE) showed a left ventricle with preserved systolic function without alterations in segmental contractility and dilated right ventricle with severe ventricular dysfunction. It also showed a fibrinous pericardial effusion. The patient was diagnosed with STEMI and was quickly referred for emergency coronary angiography. Coronary angiography showed an acute thrombus in the proximal Right Coronary Artery (RCA), with normal functioning

grafts. After performing a thrombus aspiration, a drug eluting stent was implanted, recovering a TIMI 3 flow and normalizing the ECG. A load of 250 mg ASA and 600 mg clopidogrel was administered. Likewise, a cardiac Computed Tomography (CT) scan reported organized pericardial effusion compatible with hemopericardium, which was interpreted as a possible cardiac rupture.

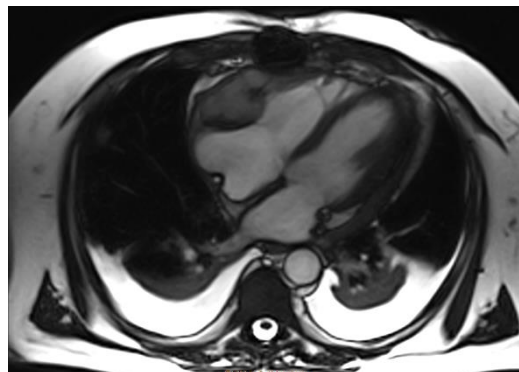
The cardiac surgery team was contacted and, in absence of clinical or echocardiographic signs of hemodynamic compromise and the recent administration of double antiplatelet therapy and heparin during catheterization, it was decided to refuse urgent pericardiocentesis, due to the danger of producing or aggravating the hemopericardium.

Laboratory studies showed normal biological parameters, except high levels of troponin I that reached a peak of 7.175 ng/L, high levels of NT-proBNP, and elevated acute phase reactants (Table 1). During the first 24 h, the patient had a fever peak of 38.5°C, and two pairs of blood cultures were extracted, being positive for Methicillin Sensitive Staphylococcus Aureus (MSSA). Antibiotic therapy was started with iv cloxacillin 4 g/6h, which was later changed to cefazolin 2 g/8h and linezolid (600 mg/bid). The patient remained febrile and with positive blood cultures despite the antibiotic treatment. A pericardiocentesis was performed on the fifth day, obtaining a dense fluid with exudate characteristics and without blood content. Cytology showed a predominance of polymorphonuclear cells (94%) and MSSA grew in the culture. That same day, due to the suspicion of purulent pericarditis, urgent surgery was performed. A “blocked mediastinum” with very difficult plane dissection due to firm adhesions was found making a good approach impossible.

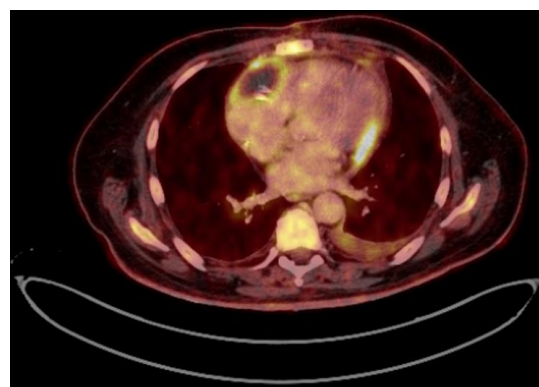
In order to complete the diagnostic study and rule out the possible focus of bacteremia, a transesophageal ultrasound was performed, which discarded infective endocarditis. A thoracoabdominal CT showed no apparent focus of infection and both cardiac and spinal Magnetic Resonance Image (MRI) was performed ruling out spondylodiscitis and showing diffuse thickening of the pericardial layers with the occupation of the atrioventricular groove. Figure 1 A-PET-CT showed a pericardial collection with increased peripheral fixation compatible with an abscess or hematoma (Fig. 2).

**Table 1:** Analytical parameters

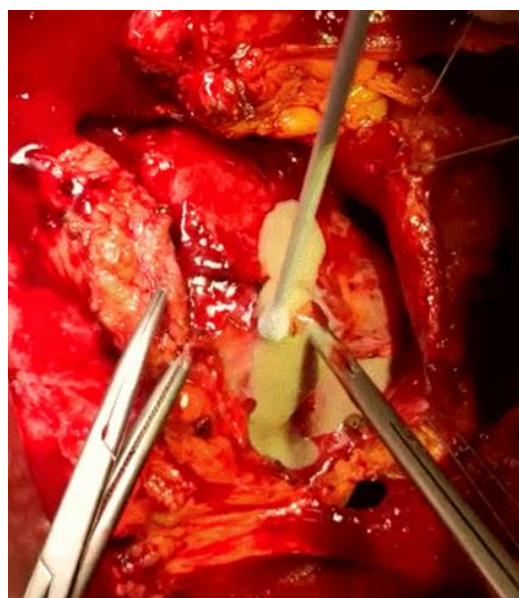
Parameter	Results in	Normal value
Hemoglobin	11.4 g/dL	13.0-17.0 g/dL
High sensitivity troponin I	7.175 ng/L	<45 ng/L
NT-ProBNP	3.562 pg/mL	0-125 pg/mL
Leukocytes	13.00*10 <sup>9</sup> /L	4.00-11.00 *10 <sup>9</sup> /L
C-Reactive Protein (CRP)	35.57 mg/dL	0.05-0.5 mg/dL



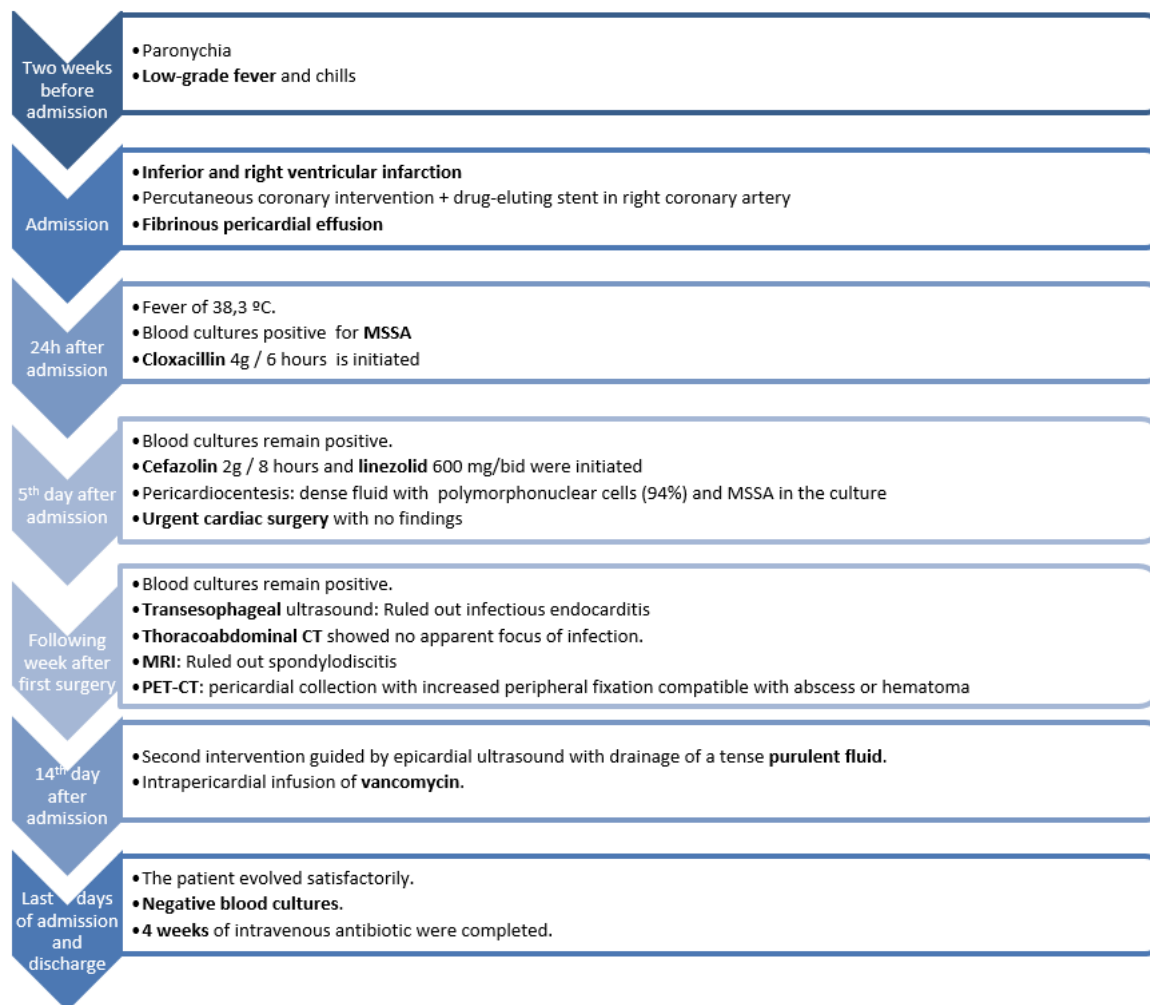
**Fig. 1:** Cardiac MRI showed ventricular interdependence, diffuse thickening of the pericardial layers with the occupation of the atrioventricular groove surrounding the right coronary artery in relation to the lateral wall of the right ventricle



**Fig. 2:** PET-CT showed a pericardial collection with increased peripheral fixation compatible with abscess or hematoma



**Fig. 3:** The right pericardial layer was dissected and the atrioventricular groove was opened draining a purulent fluid



**Fig. 4:** Diagram of patient's evolution. MSSA: Methicillin sensible staphylococcus aureus. MRI: Magnetic resonance imaging. PET-CT: An 18F-fluorodeoxyglucose positron emission tomography/computed tomography

The case was presented for discussion in the infectious heart team, concluding the need to submit the patient to a second intervention guided by epicardial ultrasound, due to the difficulties of the first one. The right pericardial layer was dissected and the atrioventricular groove was opened with drainage of a tense purulent fluid (Video 1, Fig. 3). Cleaning was carried out with irrigation of povidone serum and vancomycin, leaving an intrapericardial infusion of vancomycin and a drain.

The patient recovered satisfactorily from surgery with negative blood cultures and remaining afebrile. He was discharged from the hospital at home to complete 4 weeks of intravenous antibiotics and follow-up with blood cultures and imaging tests Fig. 4.

## Discussion

Acute myocardial infarction is the most severe manifestation of coronary artery disease, which causes

more than a third of deaths in developed nations annually (Yeh *et al.*, 2010).

In a patient with STEMI, Percutaneous Coronary Intervention (PCI) has demonstrated benefits in terms of rehospitalization for Acute Myocardial Infarction (AMI) and reduced cardiac mortality over a long time (Arslan *et al.*, 2018; Thrane *et al.*, 2020).

In our patient, with new onset right ventricular dysfunction and lower ST elevation, the diagnostic suspicion was an inferior and right ventricular infarction which was confirmed and treated with PCI. A mechanical complication associated with the fibrinous pericardial effusion was suspected. Based on these data, the case was oriented as a possible cardiac Free Wall Rupture (FWR) despite reperfusion therapies have led to a substantial reduction in the frequency of mechanical complications of AMI to the current approximately 1% (Puerto *et al.*, 2018; French *et al.*, 2010).

An FWR may be suspected when a TTE shows pericardial effusion, tamponade physiology, or epicardial clots in the pericardial space (Gong *et al.*, 2021). If the patient is stable, cardiac computed tomography or magnetic resonance imaging can also help confirm the presence and site of FWR (Matteucci *et al.*, 2019).

In patients with suspected cardiac rupture, pericardiocentesis should be considered to stabilize the patient hemodynamically, as well as urgent surgery, since it is a life threatening complication (Montrief *et al.*, 2019).

Current guidelines from the American college of cardiology foundation/American heart association and the European society of cardiology recommend early surgical intervention for hemodynamically unstable patients.

Arslan *et al.* (2018); Thrane *et al.* (2020); Puerto *et al.* (2018); French *et al.* (2010); Gong *et al.* (2021); Matteucci *et al.* (2019); O'gara *et al.* (2013). Mortality rates associated with emergent surgery remain high and are reported between 20 and 87% depending on the type of mechanical complication. Arslan *et al.* (2018); Thrane *et al.* (2020); Puerto *et al.* (2018); French *et al.* (2010); Gong *et al.* (2021); Matteucci *et al.* (2019); O'gara *et al.* (2013). In view of more limited experience with stable patients with mechanical complications, the appropriate course of treatment and timing of intervention should be discussed with the heart team or shock team (Kolh *et al.*, 2014).

In the following days, we dealt with a patient with persistent MSSA bacteremia despite adequate antibiotic therapy, with pericardial fluid demonstrative of purulent pericarditis. This entity evolves to pericardial constriction in 40% of cases and presents high mortality, around 40%, despite optimal treatment (Pankuweit *et al.*, 2005). The initial suspicion of cardiac rupture was discarded. The exhaustive study ruled out other possible foci of persistent bacteremia. In our case, due to persistent bacteremia without another focus and the presence of signs of pericardial constriction, a new surgical approach guided by epicardial ultrasound was decided. The infectious heart team discussed the case, considering, on one hand, the cons of a third sternotomy and the result of the previous one and on the other hand the strong recommendation of surgical drainage in patients with purulent pericarditis (Adler *et al.*, 2015). Finally, persistent bacteremia played a main role in the final decision. However, the surgical intervention was limited to the epicardial echo guided drainage of a tense purulent abscess because technical difficulties made correct anatomical identification and profuse cleaning impossible. We also used intrapericardial antibiotic as it is described, in spite of the low level of evidence, as a useful but not sufficient (Pankuweit *et al.*, 2005) treatment for bacterial pericarditis.

Our patient has finally been diagnosed with a bacterial pericardial infection in form of an abscess. The diagnosis can be difficult requiring a high index of suspicion. There are some risk factors for developing bacterial pericarditis such as dialysis, chemotherapy, HIV infection, previous thoracic surgery, or previous pericardial effusion (these two lasts were present in our patient). In a patient with risk factors and persistent bacteremia, we recommend being proactive in the search for possible purulent pericarditis if suspected and treating it with surgical drainage if confirmed.

We have several limitations to knowing for sure the origin of the infection. This diabetic patient probably started clinically with a wound on the finger of the hand which was complicated by bacteremia and bacteremia was complicated by purulent pericarditis. In this patient the diagnosis difficulties arise from the coincidence of two pathologies: On one hand, an ischemia heart disease with AMI and on the other hand purulent pericarditis with an abscess. The main difficulty was the differentiation between a hemopericardium and a pericardial fluid of another origin.

To the best of our knowledge, this is the first report of a patient with acute myocardial infarction and concomitant purulent pericarditis.

## Conclusion

Acute purulent bacterial pericarditis is rare and the diagnosis can be difficult requiring a high index of suspicion. The main difficulty was the differentiation between hemopericardium and purulent pericarditis. This case illustrates the importance of the infectious heart team when the diagnosis and management of the disease are challenging. Further research is needed to evaluate treatment options such as surgical approaches or the usefulness of intrapericardial antibiotics.

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## Author's Contributions

**Manel Maymí Ballesteros:** Manuscript written literature search.

**Toni Soriano-Colomé and Jaume Sagristà-Sauleda:** Manuscript reviewed and edited.

**Antonia Sambola:** Manuscript reviewed and edited, literature search.

## Ethics

This article is original and contains unpublished material. The authors declare no ethical issue. Informed consent was obtained from the patient.

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