

# A case report of cocaine abuse, acute coronary syndrome, and eroded plaque: stent or not stent?

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## Background

Intracoronary imaging techniques have allowed characterizing atherosclerotic plaques morphologically in patients with the acute coronary syndrome (ACS). Although the main feature described is plaque rupture, the use of optical coherence tomography has made it possible to objectify that the eroded plaque is not uncommon in this setting.

## Case summary

We presented a case of a 45-year-old man with active smoking and cocaine user, admitted to the emergency department for chest pain. The electrocardiogram showed ST-segment elevation myocardial infarction (STEMI) in the inferior leads. Emergent coronary angiography was performed, showing thrombotic occlusion of mid-distal right coronary artery. After successful thromboaspiration, no areas of significant angiographic stenosis were observed. Optical coherence tomography imaging at the occlusion site revealed an eroded plaque and a remaining small thrombusburden. Conservative management without stent implantation was decided. Treatments consisted of an acute phase glycoprotein IIb/IIIa inhibitor and subsequently dual antiplatelet therapy with Aspirin (ASA) and Ticagrelor 90 mg b.i.d. for 12 months. The patient remains asymptomatic and uneventful at 9-month follow-up.

## Discussion

Young age, history of active smoking, and cocaine use are common clinical features in patients with ACS due to an eroded plaque. These patients frequently display a STEMI with the involvement of a single coronary vessel. Optical coherence tomography imaging aids to a precise diagnosis and to define a proper treatment.

## Keywords

Acute coronary syndrome • Plaque erosion • Optical coherence tomography • ST-segment elevation myocardial infarction • Case report

## Learning points

- Optical coherence tomography is a high-resolution intracoronary imaging that provides accurate plaque assessment *in vivo* in the setting of the acute coronary syndrome.
- Young age, history of active smoking, and cocaine use are common clinical features in patients with acute coronary syndrome due to an eroded plaque.
- Conservative treatment without stent implantation, maintaining dual antiplatelet therapy with a potent P2Y12 inhibitor, if possible, is a safe strategy in cases of eroded plaque as a cause of the acute coronary syndrome.

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## Introduction

Acute coronary syndrome (ACS) continues to be one of the main causes of morbidity and mortality in the world.<sup>1</sup> Classically, plaque rupture is recognized as the main cause of ACS, but other possible mechanisms, such as plaque erosion (PE) or calcified nodules have been described.<sup>2</sup> An improvement in intravascular imaging techniques has enabled a more precise characterization of atherosclerotic plaques. The use of optical coherence tomography (OCT) in the setting of ACS has demonstrated PE is not an infrequent cause of ST-segment elevation myocardial infarction (STEMI), being present in 20–40% of cases.<sup>2–4</sup> Optical coherence tomography is also used to guide coronary interventions and as an aid in therapeutic decision-making, in addition to evaluating outcomes.

We present the case of an ACS patient caused by PE demonstrated by OCT and whose management was conservative with medical treatment after thrombus aspiration.

## Timeline

Time 0, arrived at emergency department	A 45-year-old man presented at emergency department due to chest pain and was diagnosed with inferior ST-segment elevation myocardial infarction.
30 min later	Emergent coronary angiography showed thrombotic occlusion of the mid-distal segment of the right coronary artery, and no lesions in the left coronary arteries.
35 min later	Optical coherence tomography imaging after successful mechanical thrombectomy revealed an eroded plaque at the level of the vessel occlusion, without significant stenosis. Medical treatment was decided.
10 days later	Patient was discharged from the hospital.
9 months later	Patient remains uneventful and asymptomatic at follow-up.

## Case presentation

The patient was a 45-year-old man with a history of active smoking (between 10 and 20 cigarettes per day from the age of 14) and frequent use of cocaine. He had no other cardiovascular risk factors neither family nor personal history of heart disease. He had mental and behavioural disorders secondary to psychotropic drug and was treated for pulmonary tuberculosis 7 years ago. His active medication consisted in quetiapine, sertraline, and omeprazole.

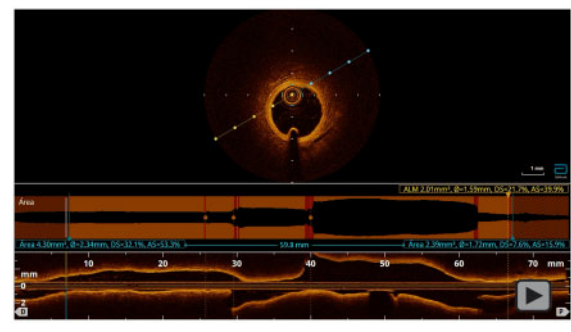
He presented at the emergency department for chest pain and syncope while driving. His physical examination showed blood pressure of 110/80 mmHg, pulse of 74 beats/min. He was afebrile and no pathological or abnormal sounds in cardiac or pulmonary hearing.

There was no sign of heart failure. The electrocardiogram showed sinus rhythm with ST-segment elevation in the inferior leads (2 mm in DII, DIII, and aVF) and mild specular changes in the high lateral leads (DI, aVL) (Figure 1). The echocardiogram demonstrated hypokinesia of the inferolateral and inferior segments with preserved ejection fraction, ruling out significant valve disease and mechanical complications. Loading doses of aspirin (300 mg) and ticagrelor (180 mg) were administered, in addition to unfractionated heparin (8000 UI) before coronary angiography. After 2 h of ischaemia onset, the coronary angiography revealed left coronary artery tree without significant stenosis (Supplementary material online, Figure) and a thrombotic occlusion of the mid-distal segment of the right coronary artery (Figure 2). Following successful thromboaspiration, artery reperfusion was achieved, but no significant coronary stenosis at the occlusion site was found (Figure 3). Hence, OCT imaging was performed for a better understanding of the underlying cause of the coronary occlusion. Optical coherence tomography imaging showed a mild atherosclerotic eroded plaque and minimal residual thrombus but with a minimal lumen area of 6 mm<sup>2</sup> (Figures 4 and 5). Therefore, pharmacological management including intravenous infusion of a glycoprotein 2b/3a inhibitor (Abciximab) without stent implantation was decided. The abciximab infusion was maintained for 12 h at a rate of 0.125 µg/kg/min, in this case 10 µg/min, after the administration of an initial bolus of 20 mg, corresponding to 0.25 mg/kg, for 5 min. The patient had a satisfactory cardiovascular evolution during his hospital stay, and he was discharged after 10 days of admission. Treatment at discharge included hygienic-dietary recommendations as smoking and drug cessation and dual antiplatelet therapy with aspirin and ticagrelor 90 mg b.i.d. for 12 months, and subsequently, aspirin was recommended indefinitely. Also medical treatment with low-dose ACE inhibitors (ACEI), statin, and proton pump inhibitors was indicated. At 9-month follow-up, the patient remains asymptomatic and uneventful.

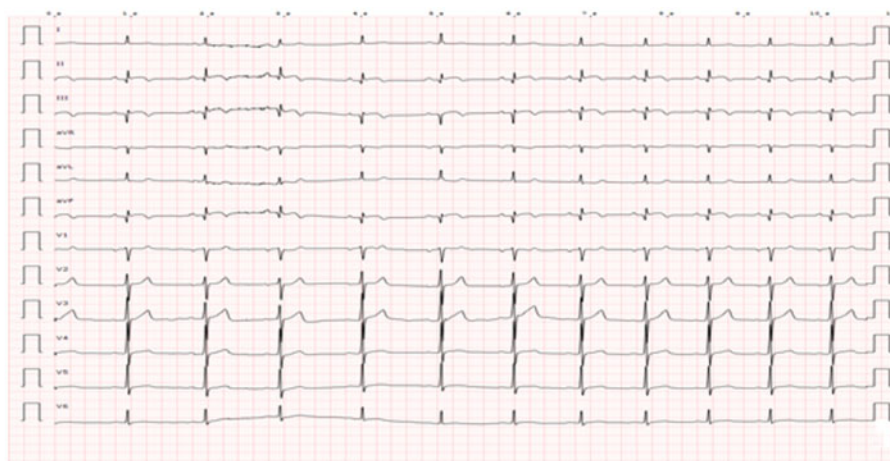
## Discussion

Plaque erosion is not an uncommon cause of ACS. The use of a high-resolution intracoronary imaging technique has allowed *in vivo* identification of the morphological characteristics of the atherosclerotic plaque in the ACS.<sup>5</sup>

There are some clinical predictors of ACS caused by PE, such as an age younger than 50 years and active smoking, in addition to



**Video 1** Optical coherence tomography showing the eroded plaque after a successful thromboaspiration.



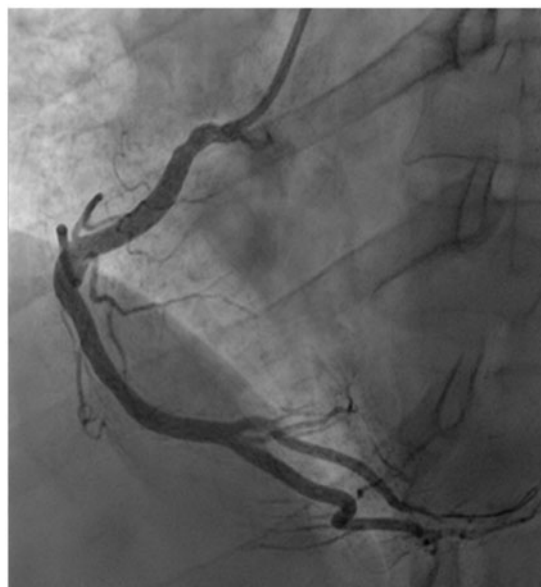
**Figure 1** Twelve-lead electrocardiogram showing sinus rhythm with ST-segment elevation in the inferior leads and mild specular changes in the high lateral leads.



**Figure 2** Emergent coronary angiogram showed a thrombotic occlusion of the mid-distal segment of the right coronary artery.

a lower prevalence of other cardiovascular risk factors, such as hypertension or dyslipidaemia.<sup>6</sup> This is the case of our patient, who is also a frequent cocaine user. Cocaine use induces myocardial ischaemia through multiple mechanisms: fosters myocardial oxygen consumption by increasing heart rate and blood pressure, decrease oxygen supply via coronary artery vasoconstriction, increase in serum levels of plasminogen-activator inhibitor and stimulate platelet aggregation due to increased platelet activity and count.<sup>7</sup>

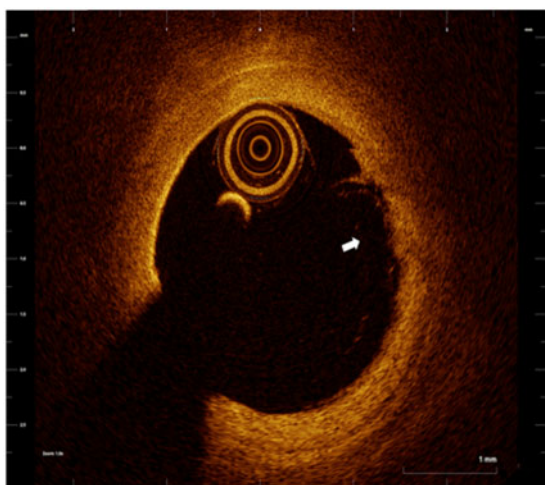
Non-ST-segment elevation myocardial infarction represents the most common clinical presentation of an ACS due to PE,<sup>2</sup> but STEMI



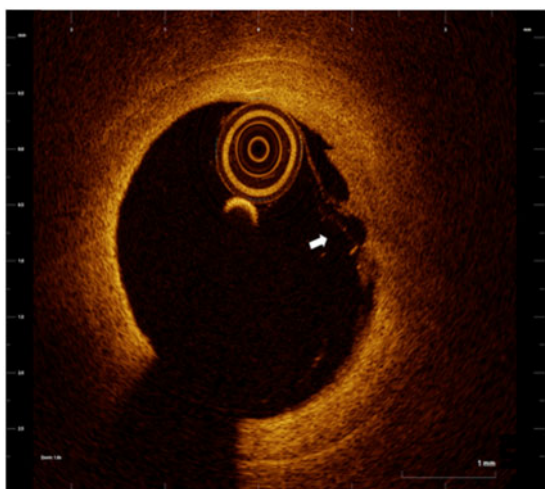
**Figure 3** Coronary angiogram showing reperfusion of right coronary artery after successfully thromboaspiration, without significant areas of stenosis.

can also occur, as in the EROSION study,<sup>8</sup> where more than 90% of cases were STEMI. Furthermore, our patient had single-vessel coronary artery disease. This is a characteristic of PE, affecting usually a single coronary vessel.<sup>9</sup>

Optical coherence tomography is a high-resolution imaging modality that enables detailed visualization of coronary arteries and its components, providing accurate plaque assessment to select the proper treatment strategy. Our OCT images exhibited plaque erosion with minimal residual thrombus, but with an intact fibrous cap,



**Figure 4** Optical coherence tomography image showing a mild atherosclerotic eroded plaque with minimal residual thrombus.



**Figure 5** Optical coherence tomography image showing a mild atherosclerotic eroded plaque with minimal residual thrombus.

which constitutes OCT-defined PE. The OCT is a useful tool also to aid therapeutic decision-making. In our case, after thromboaspiration, no significant angiographic stenosis of the artery was observed, normal blood flow was restored, and the patient was asymptomatic, so conservative management was chosen. Management with intensive antiplatelet therapy using treatments with different mechanisms of action such as aspirin and ticagrelor, in addition to a glycoprotein 2b/3a inhibitor has been shown to be effective and safe in this type of patient.<sup>10,11</sup> The benefits of using drug-eluting stents to seal the eroded plaque are a current matter of debate. After 9 months of ACS, the patient remains asymptomatic, continuing under dual antiplatelet

therapy, proton pump inhibitor (IPP), ACEI, and statin, free of cardiovascular adverse events and bleeding complications.

## Lead author biography



Isabel Muñoz Pousa, MD, was born on 23 June 1992. She is a cardiology trainee at University Hospital Álvaro Cunqueiro in Vigo, Spain. His line of research is focused on acute coronary syndrome and heart failure.

## Supplementary material

[Supplementary material](#) is available at *European Heart Journal—Case Reports* online.

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**Slide sets:** A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

**Consent:** The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

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