



CASE REPORT

Simultaneous Thrombotic Involvement of LAD and RCA in Combined ST-segment Elevation Myocardial Infarction: A Rare Clinical Entity

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ABSTRACT

Simultaneous acute thromboses in both the left and right coronary arteries (RCAs) are uncommon. A 39-year-old male presented with chest pain and was admitted to the hospital. Electrocardiography (ECG) revealed ST-segment elevation in both the inferior and anterior leads. Due to the presence of ST-segment elevation myocardial infarction, emergency coronary angiography was performed. The angiogram demonstrated a complete occlusion in the proximal left anterior descending artery and a critical thrombotic lesion in the RCA. Both lesions were treated with stent placement. Acute coronary syndromes can present with varying ECG patterns, and simultaneous ST-segment elevations in the anterior and inferior leads are rarely observed. This report describes a case of combined acute coronary syndrome.

Keywords: Acute coronary syndrome, simultaneous infarction, concomitant coronary occlusion

INTRODUCTION

In clinical settings, the occurrence of simultaneous thrombotic lesions in both the right and left coronary arteries is uncommon. In anterior myocardial infarction (MI), ST-segment elevation is typically seen in the anterior leads, with reciprocal ST-segment depression usually appearing in the inferior leads. Similar cases have been documented in the literature,^{1,2} suggesting that concurrent ST-segment elevations may result from variations along the left anterior descending (LAD) artery pathway. We report a case involving simultaneous anterior and inferior ST-segment elevation MI (STEMI), caused by a complete acute occlusion of the LAD and a significant thrombotic lesion in the right coronary artery (RCA).

CASE REPORT

A 39-year-old male presented to the emergency department with severe chest pain that began 1 h before arrival. He was an active smoker with a history of hypertension, but no known coronary artery disease or diabetes. On admission, his vital signs were as follows: blood pressure 90/65 mmHg, heart rate 75 bpm, respiratory rate 22 breaths/min, and oxygen saturation 93% on room air. Physical examination showed normal heart sounds without murmurs or additional sounds, clear lung fields bilaterally, and no peripheral edema. Electrocardiography (ECG) revealed normal sinus rhythm at 70 bpm and ST-segment elevation

in both the inferior and anterior leads (Figure 1). A diagnosis of STEMI was made, and the patient was admitted to the coronary intensive care unit (ICU). His Killip class was II, indicating mild heart failure without signs of cardiogenic shock. Despite borderline hypotension (blood pressure 90/65 mmHg), the patient did not meet the criteria for cardiogenic shock, as there was no sustained hypotension, marked tachycardia, altered consciousness, or evidence of severe end-organ hypoperfusion. He was promptly given loading doses of aspirin (300 mg), clopidogrel (600 mg), and intravenous unfractionated heparin (5000 U) before undergoing urgent coronary angiography without thrombolytic therapy.

Emergency coronary angiography was performed based on the diagnosis of simultaneous acute inferior and anterior MI. The angiogram revealed complete occlusion in the proximal LAD artery and a significant lesion in the RCA (Figure 2). The RCA lesion was severe but not fully occlusive and did not show obvious signs of plaque rupture or thrombus on angiography. Stenting was performed on both lesions using drug-eluting stents, resulting in optimal angiographic outcomes and TIMI-3 flow restoration in both the LAD and RCA. After complete revascularization, the patient was monitored in the coronary ICU with stable hemodynamic status. Following successful revascularization of the LAD occlusion, the patient experienced immediate relief from chest pain, and his hemodynamic parameters significantly improved, with blood pressure rising from 90/65 mmHg to 110/70 mmHg, heart

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rate increasing to 76, respiratory rate decreasing to 18 breaths/min, and oxygen saturation improving to 94%. A followup ECG immediately after revascularization showed marked resolution of ST-segment elevations in both the anterior and inferior leads. Post-procedure therapy in the ICU included aspirin 100 mg/day, clopidogrel 75 mg/day, atorvastatin 80 mg/day, pantoprazole 40 mg/day, and enoxaparin

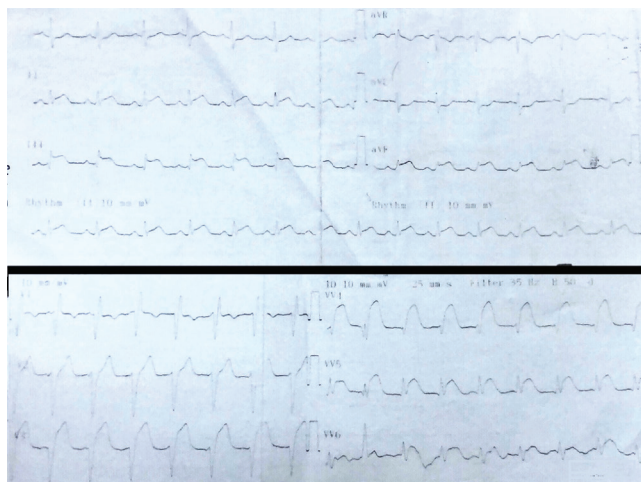


Figure 1. Admission ECG showing simultaneous ST-segment elevations in the anterior (V1-V4) and inferior leads (II, III, aVF), indicating acute myocardial infarction affecting both the LAD and RCA territories

ECG: Electrocardiography, LAD: Left anterior descending, RCA: Right coronary artery

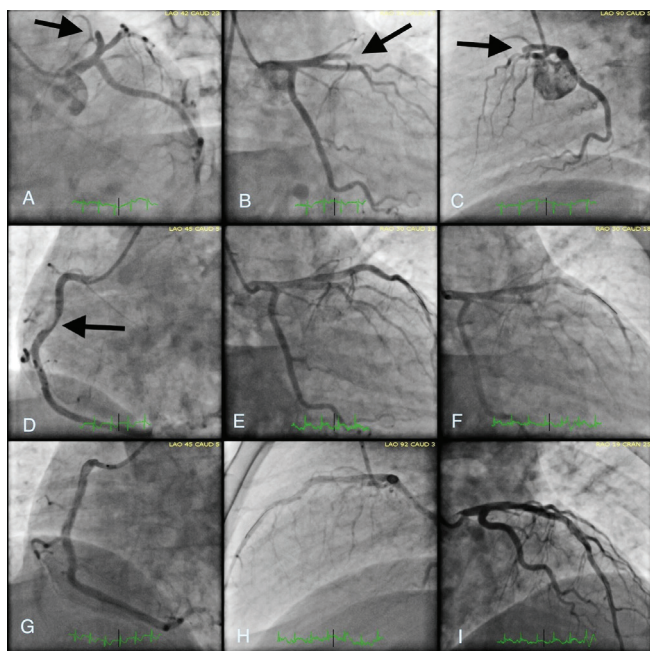


Figure 2. A, B, C, D) Coronary angiographic images taken during acute STEMI presentation. A, B, C) Show total occlusion (indicated by black arrows) in the proximal LAD artery. D) Shows a significant thrombotic lesion (indicated by black arrows) in the mid-segment of the RCA. E, F, G, H, I) Postprocedural coronary angiography images following successful percutaneous coronary intervention and complete revascularization

STEMI: ST-segment elevation myocardial infarction, LAD: Left anterior descending, RCA: Right coronary artery

60 mg twice daily. Beta-blockers and ACE inhibitors were initially withheld due to borderline hypotension. Intravenous hydration was initiated to address the borderline hypotension, leading to improved blood pressure and clinical stability.

DISCUSSION

Acute simultaneous coronary occlusion (ASCO) is a rare condition in clinical practice. STEMI typically results from a single epicardial coronary artery occlusion or thrombotic lesion, causing ST-segment elevation in the corresponding ECG leads and reciprocal ST-segment depression in opposite leads. However, simultaneous ST-segment elevations in both the anterior and inferior leads are unusual in acute coronary syndromes. These combined anterior and inferior ST-segment elevations present diagnostic challenges, requiring careful differentiation from conditions such as pericarditis, diffuse myocarditis, and acute aortic dissection. The relatively young age of our patient emphasizes the need to recognize early-onset coronary artery disease, especially in smokers or those with multiple cardiovascular risk factors. According to literature case series, the incidence of ASCO is around 2.5%.^{3,4} While the exact mechanism of ASCO is not fully understood, it has been linked to several factors, including the abuse of vasoactive agents, hypercoagulable states, and coronary vasospasm.⁵⁻⁷ In rare cases, left ventricular thrombi have also been implicated.⁸

Some studies suggest that simultaneous plaque ruptures in different coronary arteries, along with thrombosis due to hemodynamic instability, may contribute to ASCO.⁹ Although commonly observed, our patient did not develop cardiogenic shock. In a case series by Pollak et al.,⁴ 23% of patients experienced ventricular arrhythmias, and 36% developed cardiogenic shock. Similarly, a review by Mahmoud et al.⁶ found that cardiogenic shock and sudden cardiac death occurred in approximately 40-50% of cases. The RCA and LAD are the most commonly affected coronary arteries in ASCO, with the most frequent ECG finding being simultaneous ST-segment elevations in the anterior and inferior leads.⁴

Although isolated lesions in a superdominant LAD can rarely present with both anterior and inferior ST-segment elevations, our patient also had significant RCA stenosis. Therefore, we interpreted the ECG findings as indicating simultaneous ischemia in both LAD and RCA territories. Our patient's history did not reveal drug abuse or underlying hypercoagulable conditions, and no triggers for vasospasm were identified. This case highlights that prompt and complete revascularization of multiple culprit lesions can significantly improve clinical outcomes, prevent progression to cardiogenic shock, and reduce myocardial damage.

Further prospective studies are needed to better understand the pathophysiology of ASCO and to establish optimal management strategies, ultimately improving clinical outcomes.

Conclusion

Acute coronary syndromes can present atypical ECG findings. Simultaneous ST-segment elevations in the anterior and inferior leads are rare but clinically significant. Revascularization of all affected

lesions should be prioritized, as this rare condition has a high risk of cardiogenic shock. Early and complete revascularization can help minimize total myocardial damage and improve patient outcomes.

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