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(CASE REPORT)

# The devastating impact of combined myocardial infarction and pulmonary embolism following hip surgery

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## Abstract

This case report presents a complex clinical scenario involving the simultaneous occurrence of acute myocardial infarction (AMI) and pulmonary embolism (PE). A 58-year-old male with underlying cardiovascular risk factors and past history of hip surgery in the last 25 days presented with acute respiratory distress, chest pain, and lower extremity edema. Diagnostic workup confirmed the presence of both AMI and PE, leading to a rapid deterioration in the patient's condition. Despite aggressive medical management, including antithrombotic therapy, vasopressor support, and advanced cardiac life support, the patient ultimately succumbed to the severity of the illness. This case highlights the challenges associated with managing patients with this dual diagnosis and emphasizes the importance of early recognition, prompt diagnosis, and aggressive treatment. Future research is needed to identify novel biomarkers and therapeutic strategies to improve patient outcomes.

**Keywords:** Myocardial infarction; Pulmonary embolism; Acute coronary syndrome; Cardiovascular disease; Acute respiratory distress syndrome; Cardiogenic shock; Ventricular arrhythmia

## 1. Introduction

Myocardial infarction (MI), a life-threatening condition resulting from inadequate blood supply to the heart muscle, remains a significant global health concern. While various complications can arise post-MI, the simultaneous occurrence of pulmonary embolism (PE) is a particularly severe and often fatal event. PE, a condition characterized by the blockage of pulmonary arteries by blood clots, can significantly worsen the prognosis of patients with MI.

The combination of MI and PE presents a complex clinical scenario that requires prompt diagnosis and aggressive management. The underlying pathophysiological mechanisms, including increased blood coagulability, endothelial dysfunction, and inflammatory responses, contribute to the development of both conditions [1].

This case report illustrates the challenges associated with managing patients with this dual diagnosis. By delving into the clinical presentation, diagnostic workup, and therapeutic interventions, we aim to highlight the importance of early recognition, timely intervention, and a multidisciplinary approach to improve patient outcomes.

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## 2. Case report

A 58-year-old male with a history of hypertension, heavy smoking, recent hip surgery and newly diagnosed diabetes mellitus presented to the emergency department in acute respiratory distress. His symptoms included severe shortness of breath, chest pain, and lower extremity edema, indicative of a critical cardiac event.

On physical examination, the patient appeared acutely ill, diaphoretic, and tachypneic. Vital signs revealed tachycardia, tachypnea, and hypotension. Cardiovascular examination revealed a tachycardic rhythm, a displaced point of maximal impulse, a third heart sound (S3 gallop), and a systolic murmur. Respiratory examination showed decreased breath sounds bilaterally, inspiratory crackles, and jugular venous distention. Abdominal examination was unremarkable, and peripheral vascular examination revealed bilateral lower extremity edema.

A comprehensive evaluation revealed a complex clinical picture involving both myocardial infarction and pulmonary embolism. Electrocardiogram demonstrated ST-segment elevation and Q waves, confirming an acute myocardial infarction superimposed on previous myocardial damage. Transthoracic echocardiography revealed impaired left ventricular function, a large apical thrombus predisposing to further embolization, and right ventricular dysfunction secondary to pulmonary hypertension. Computed tomography pulmonary angiography confirmed the presence of multiple large pulmonary emboli, significantly compromising pulmonary blood flow and leading to acute respiratory failure.

The patient's clinical course was complicated by recurrent life-threatening ventricular arrhythmias and the development of cardiogenic shock, reflecting the severe compromise of both the heart and lungs. Despite aggressive medical management, including antithrombotic therapy, vasopressor support, and advanced cardiac life support, the patient's condition deteriorated, and he ultimately succumbed to the severity of his illness.

## 3. Discussion

The complex interplay of acute myocardial infarction (AMI) and pulmonary embolism (PE) presents a formidable clinical challenge. This case highlights the devastating consequences of this dual diagnosis, emphasizing the need for early recognition, prompt diagnosis, and aggressive management.

The patient's underlying cardiovascular risk factors, including hypertension, smoking, and diabetes mellitus, significantly increased his susceptibility to both conditions. The acute myocardial infarction, characterized by ST-segment elevation and Q wave formation on electrocardiogram, led to significant myocardial damage and impaired cardiac function [2]. The large apical thrombus identified on echocardiography posed a significant risk of further embolization, contributing to the development of pulmonary embolism [3].

The multiple large pulmonary emboli, as confirmed by computed tomography pulmonary angiography, significantly compromised pulmonary blood flow, leading to acute respiratory failure and right ventricular strain. The increased afterload on the right ventricle further exacerbated the patient's cardiac dysfunction, contributing to the development of cardiogenic shock [4].

The patient's clinical course was further complicated by the development of life-threatening arrhythmias, including ventricular fibrillation. These arrhythmias, often triggered by myocardial ischemia, electrolyte disturbances, and autonomic dysfunction, can rapidly deteriorate into cardiac arrest [5].

The management of patients with combined AMI and PE requires a multidisciplinary approach involving cardiologists, pulmonologists, intensivists, and other healthcare professionals. Prompt diagnosis and aggressive treatment are essential to improve patient outcomes. Key therapeutic interventions include [6]:

- Antithrombotic therapy: To prevent further thromboembolic events and improve pulmonary blood flow.
- Vasopressor support: To maintain hemodynamic stability and organ perfusion.
- Antiarrhythmic therapy: To control arrhythmias and prevent sudden cardiac death.
- Mechanical circulatory support: In severe cases, devices such as extracorporeal membrane oxygenation (ECMO) may be considered to provide temporary circulatory and respiratory support.
- Reperfusion therapy: Percutaneous coronary intervention (PCI) or fibrinolytic therapy may be considered to reperfuse the infarcted myocardium.

While significant advancements have been made in the management of acute coronary syndromes and pulmonary embolism, the combined presentation of these conditions remains a significant challenge. Future research is needed to identify novel biomarkers and therapeutic strategies to improve patient outcomes. A deeper understanding of the underlying pathophysiological mechanisms, including inflammation, oxidative stress, and endothelial dysfunction, may lead to the development of targeted therapies. Additionally, the role of genetic factors in predisposing individuals to both conditions warrants further investigation.

It is crucial to emphasize the importance of risk factor modification, including lifestyle changes and medication adherence, in preventing the development of cardiovascular disease. Early identification and management of risk factors can significantly reduce the incidence of AMI and PE. Additionally, public health initiatives aimed at promoting healthy lifestyles and increasing awareness of cardiovascular disease can contribute to reducing the burden of these conditions.

## 4. Conclusion

This case report underscores the critical importance of early recognition and aggressive management of the combined presentation of acute myocardial infarction (AMI) and pulmonary embolism (PE). Despite significant advancements in cardiovascular medicine, this complex clinical scenario remains a formidable challenge with high mortality rates. Future research is essential to identify novel biomarkers and therapeutic strategies to improve patient outcomes. A multidisciplinary approach involving cardiologists, pulmonologists, and intensivists is crucial to optimize patient care and enhance survival rates. By emphasizing risk factor modification, early diagnosis, and timely intervention, we can strive to improve the prognosis of patients with this devastating condition.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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