

Pulmonary embolism in a young patient: a case report

Rodanim Vázquez-Ramírez^{1,a}; Iván Aguilar-Ávila^{1,a}; Jorge Enrique Méndez-Jiménez^{1,a}; Arturo García-Galicia^{1,b}; Álvaro José Montiel-Jarquín^{1,c}; Deyaneira Palacios-Figueroa^{1,d}

¹ Instituto Mexicano del Seguro Social (Mexican Social Security Institute), Hospital de Especialidades de Puebla, Centro Médico Nacional “General de División Manuel Ávila Camacho.” Heroica Puebla de Zaragoza, Mexico.

^a Internal Medicine resident; ^b Pediatrician; ^c General surgeon; ^d General practitioner.

ABSTRACT

Pulmonary embolism is one of the leading causes of precordial pain in the hospital setting. We present the case of a 31-year-old male patient who reported sudden precordial pain and dyspnea with minor exertion, a significant elevation of D-dimer and, as revealed by computed tomography angiography (CTA), the presence of a thrombus in the main, segmental and subsegmental pulmonary branches. He underwent an embolectomy, with subsequent recovery and good progress.

Pulmonary embolism produces pathophysiological interference with gas exchange and circulation, and the cause of death in these patients is right ventricular failure due to acute pressure overload. The most frequent clinical manifestations and signs are dyspnea, palpitations, chest pain, syncope and hemoptysis, tachycardia, tachypnea and jugular venous distension. The McGinn-White sign consists of an electrocardiographic trace showing a deep wave S in lead I, along with a Q wave and an inverted T wave in lead III. This electrocardiographic pattern has been reported in 7 % to 19 % of patients presenting with pulmonary embolism.

Catheter-directed therapy is the treatment of choice in patients with intermediate risk and proximal thrombus in the pulmonary arteries. This approach includes catheter-directed thrombolysis and mechanical aspiration thrombectomy, yielding favorable results in reducing pulmonary hypertension and improving hemodynamic stability. However, these cases are rare in young people without major risk factors. Prompt management avoids associated complications such as right-sided heart failure and prevents chronic complications.

Keywords: Pulmonary Embolism; Chest Pain; Dyspnea (Source: MeSH NLM).

INTRODUCTION

Pulmonary embolism is a condition that consists in the obstruction of blood flow in a pulmonary artery by an embolus originating from a distant site in the vasculature. It is more common in individuals with risk factors such as diabetes, arterial hypertension, major surgical procedures and smoking ⁽¹⁾. However, it is very uncommon in young individuals, especially those without significant risk factors. Timely identification and targeted treatment reduce both acute and chronic complications, impacting patient morbidity and mortality.

Pulmonary embolism is of epidemiological importance as the third most common cardiovascular syndrome, following only myocardial infarction and stroke ^(2,3). The annual incidence is 39 to 115 cases per 100,000 inhabitants, but its incidence rate has recently increased. This condition is responsible for approximately 300,000 deaths per year ⁽⁴⁾.

There are various classifications of predisposing factors, relevant for decision-making. These can be divided into non-modifiable factors (patient-specific factors, such as age, sex,

etc.) and modifiable factors (present in the individual's environment, such as smoking, physical inactivity, obesity, etc.) ^(5,6).

CLINICAL CASE

A 31-year-old male patient with a history of chronic-degenerative, infectious-contagious and transfusion-related history. He denied smoking and had a body mass index of 30.8. Regarding his surgical history, he had undergone arthroscopy of the right knee for meniscal tear one month prior to the onset of symptoms.

The symptoms began with oppressive precordial pain, which the patient rated as 10/10 on the visual analog scale (VAS) and exacerbated by deep inspiration, without alleviation or radiation. Subsequently, he experienced dyspnea on slight exertion and a one-minute episode of syncope, resulting in a fall from standing height and contusions to the knee and skull. He was admitted to the local general hospital with precordial pain and a pulse oximetry at 85 %. The electrocardiogram (ECG) showed sinus tachycardia (122 bpm) and a McGinn-White sign

Corresponding author:

Arturo García-Galicia
neurogarcia Galicia@yahoo.com.mx

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(S1-Q3-T3) (Figure 1). Serology reported a D-dimer level of 1,795 µg/dL, CPK of 113 mg/dL and CPK-MB of 17.1 mg/dL. Computed tomography angiography (CTA) revealed pulmonary embolism in the main, segmental and subsegmental branches (Figure 2). Anticoagulation therapy with enoxaparin was started, and the patient was referred to a tertiary care center.

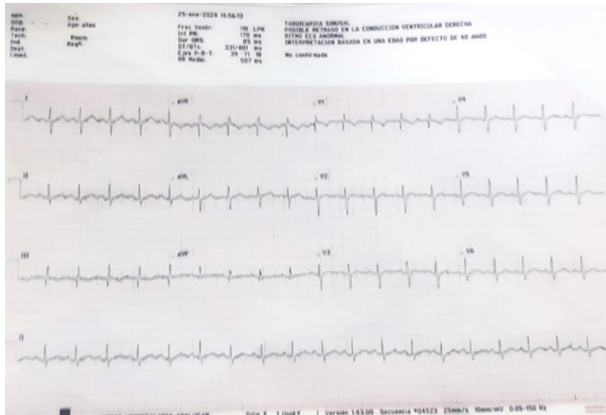


Figure 1. ECG showing the McGinn-White sign (S1Q3T3)



Figure 2. CTA showing thrombus at the bifurcation of the main pulmonary vessels

He was admitted to the unit hemodynamically stable, tachycardic, neurologically intact and with oxygen support via nasal cannula. After evaluation by the cardiac catheterization laboratory, it was determined that he was not a candidate for mechanical thrombectomy via interventional radiology because he was hemodynamically stable and was within the time window for fibrinolysis. However, during the hospital stay, he developed hemodynamic instability with a systolic blood pressure (SBP) < 90 mmHg, and his case was therefore classified as PESI class IV (high risk of death). He was accepted by thoracic surgery for mechanical thrombectomy, and was taken to the operating room, where a thrombus was identified in the main branches and at the confluence (Figure 3), and was removed without complications (Figure 4). Finally, he was transferred to the intensive care unit for postsurgical care, with favorable recovery and subsequent discharge without complications.

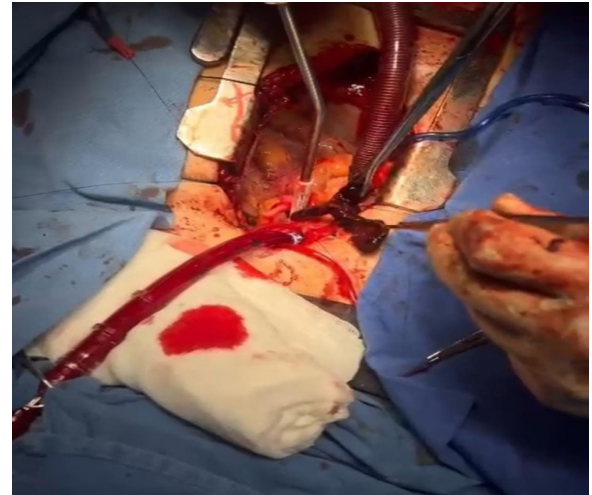


Figure 3. Thrombectomy of major vessels. Presence of thrombus in the main vessels

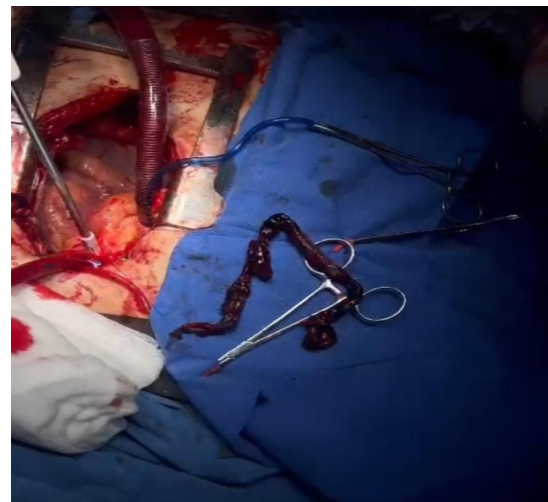


Figure 4. Thrombus accounting for the patient's symptoms

DISCUSSION

Pulmonary embolism is divided by the European Society of Cardiology (ESC) into three classes: with odds ratio (OR) > 10 ("strong") when there is fracture of lower limb, hospitalization for heart failure or fibrillation within previous three months, and hip or knee replacement; with OR = 2-9 ("moderate risk") when there is arthroscopic knee surgery, autoimmune diseases or blood transfusion; and with OR < 2 ("low risk") when there has been bed rest for longer than three days, diabetes and arterial hypertension^(4,7). Risk stratification in suspected or confirmed embolism is useful as it helps determine the most appropriate therapeutic approach⁽⁸⁾.

Arthroscopy has brought advantages in the management of knee conditions, including fewer complications, earlier

rehabilitation, reduced costs and shorter time to return to work. Complications associated with this procedure are rare, with frequencies ranging from 0.27 % to 4.7 %. Deep vein thrombosis and pulmonary embolism following knee arthroscopy have been reported with incidences as low as 0.34 % in asymptomatic patients and as high as 17.9 % in the immediate postoperative period ⁽⁹⁾.

Pulmonary embolism disrupts gas exchange and circulation due to its pathophysiology, and the cause of death in these patients is right ventricular failure resulting from acute pressure overload ⁽⁴⁾.

The most common clinical manifestations and signs are dyspnea, palpitations, chest pain, syncope and hemoptysis, as well as tachycardia, tachypnea, and jugular venous distention ^(10,11).

The McGinn-White electrocardiographic sign is characterized by a deep S wave in lead I, in addition to a Q wave in lead III and an inverted T wave in this same lead. This electrocardiographic pattern has been reported in 7 % to 19 % of patients with pulmonary embolism ⁽¹²⁾.

In young patients, it is important to recognize signs and symptoms to identify the condition; in severe cases, the treatment of choice is surgical embolectomy, which reduces systemic embolism and helps rule out causes of recurrent emboli ^(13,14).

Catheter-directed is the treatment of choice in patients with intermediate risk and thrombus at the proximal level of the pulmonary arteries. It consists of catheter thrombolysis and thrombectomy by mechanical aspiration, with favorable results, including a reduction in pulmonary hypertension and improved hemodynamic stability ⁽¹⁵⁾.

Oral anticoagulation is recommended for patients with low-risk pulmonary embolism according to the pulmonary embolism severity index. Some authors mention that parenteral anticoagulation and vitamin K antagonists can be considered; however, direct oral anticoagulants are currently preferred due to their efficacy ⁽¹⁶⁾.

This case is relevant due to its classic presentation, despite occurring at an uncommon age. The age group may lead to delays in timely management by overlooking the diagnosis, potentially worsening the patient's prognosis.

In conclusion, pulmonary embolism is one of the most common conditions in the intensive care unit; nevertheless, its occurrence is rare in young individuals without significant risk factors. Prompt management avoids associated complications such as right-sided heart failure and prevents chronic complications.

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