

Case Report

Widespread Bilateral Pulmonary Embolism: A Case Report

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Abstract: We present a 45-year-old man with a personal pathological history of deep vein thrombosis of the lower limbs without current medical management. It begins suddenly with respiratory difficulty, decreased oxygen saturation, and dyspnea. Upon arrival at the emergency department, chest angio tomography was performed, highlighting bilateral filling defects, from main branches to segmental branches, so admission to the hemodynamics room for right heart catheterization was decided. Thrombectomy, bilateral ultrasound rheolysis and targeted fibrinolysis were performed, with improvement in mean pulmonary artery pressure (mPAP) to 19 mmHg compared to the previous one.

Keywords: Pulmonary embolism, thrombus, widespread, rheolysis, embolectomy, Catheter-Directed Thrombolysis.

INTRODUCTION

Pulmonary embolism occurs when a clot develops into the branching pulmonary vasculature. These thrombi generally develop from the venous system of pelvic limbs [1]. The annual incidence is reported to be approximately 1 in 1000 people [2, 3]. According to world statistics, approximately 20% of patients who are treated for acute pulmonary embolism die within a period of 90 days, however, pulmonary embolism is not commonly the cause of death because it coexists with other serious diseases, such as cancer, sepsis, critically ill patients, or after surgery [2]. The initial approach to pulmonary embolism consists of stratification of the risk of its presentation, combined with serum markers such as D-dimer. Only a minority of patients who are evaluated for pulmonary embolism require contrasted imaging studies. Although a large proportion of patients remit with oral anticoagulant treatment (low-risk pulmonary embolism), a subgroup of patients (5%) presents a high-risk pulmonary embolism, which involves shock, tissue hypoperfusion, hypotension (systolic blood pressure of <90 mm Hg or a decrease in systolic blood pressure of >40 mm Hg that is not caused by sepsis, arrhythmia, or hypovolemia), and/or cardiac arrest. Observational data support immediate reperfusion therapy once contraindications (e.g., brain metastases, bleeding disorders, and recent surgery) have been ruled out [4].

CASE PRESENTATION

A 45-year-old man presents to the emergency department (ED) with 1-week history of breathlessness and swollen legs. He has family history of two brothers who died from lung and gastric cancer, respectively and history of obesity and arterial hypertension. Upon arrival to the emergency department, there was no pulse and no breathing, so cardiopulmonary resuscitation (CPR) was provided for 5 minutes with return of spontaneous circulation. His heart rate post-CPR was 88 beats per minute, blood pressure 86/66 mmHg, median arterial pressure (MAP) 72.6 mm Hg, respiratory rate 28 breaths per minute, temperature 36°C, and oxygen saturation 70% while he is breathing ambient air. Auscultation of his chest reveals normal breath sounds and rhythmic heart sounds with the presence of third sound. An examination of the legs reveals heaviness, positive Homans and Ollow signs. His creatinine and troponin levels within normal limits, D-dimer level was 19970 ng per milliliter and chest radiograph was normal. The patient's Wells score was 7.5 (on a scale of 0 to 12.5, with higher scores indicating a higher probability of pulmonary embolism), revised Geneva score was 13 (on a scale of 0 to 22) and pulmonary severity index 4 points. A 12-leads electrocardiogram (ECG) with sinus tachycardia, incomplete

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right bundle branch block and Mc-Guinn White pattern (Figure 1) and transthoracic echocardiogram (TTE) with dilated right ventricle of 42 millimeters, tricuspid annular plane systolic excursion (TAPSE) 13 mm, pulmonary artery systolic pressure (PASP) 45 mmHg, decreased right ventricular systolic function, and McConnel sign were performed.

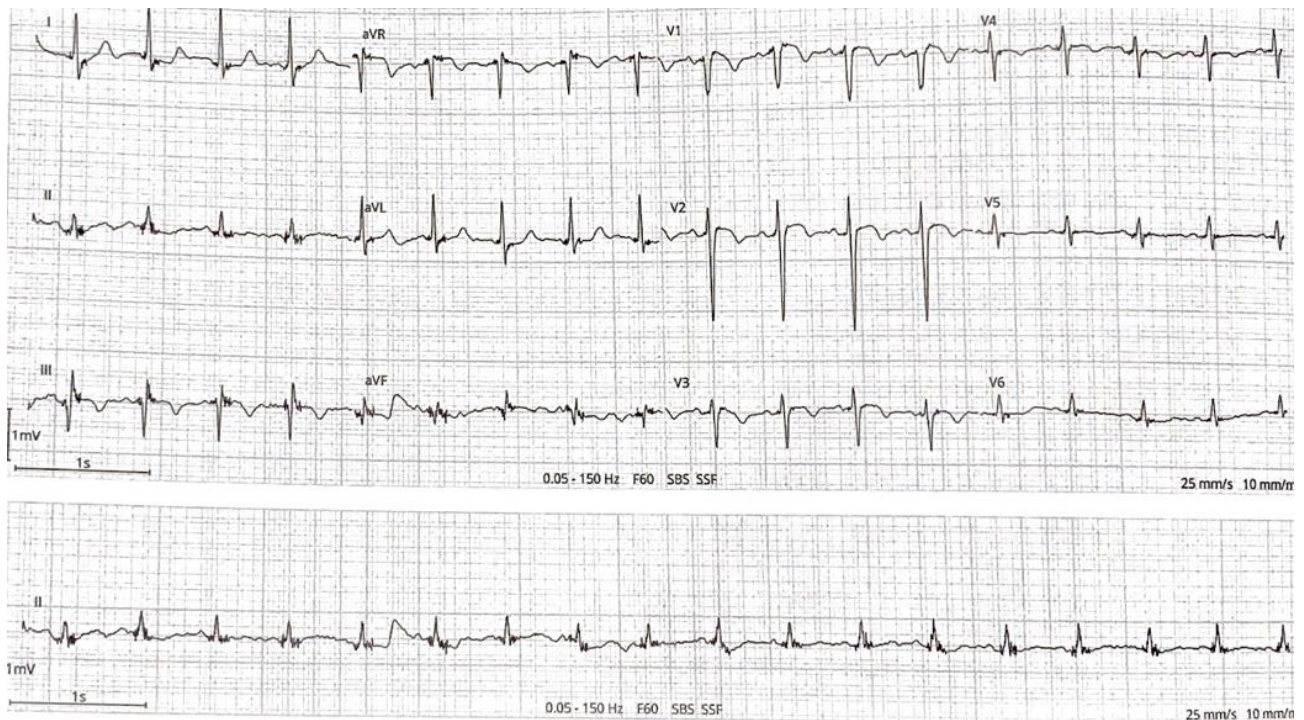


Figure 1: 12 leads-ECG shows a sinus tachycardia, incomplete right bundle branch block and S1Q3T3 pattern (Mc-Guinn White)

The computed tomography angiography reveals deep venous thrombosis at the level of the left femoral vein with extension to the popliteal vein, pulmonary structures with filling defect at the level of the right and left branch of pulmonary, interlobar and segmental arteries on an extensive bilateral basis, with obstruction of 90% of the vessel; pulmonary trunk 37 mm, right branch 26.4 mm and left branch 24.2 mm (Figure 2).

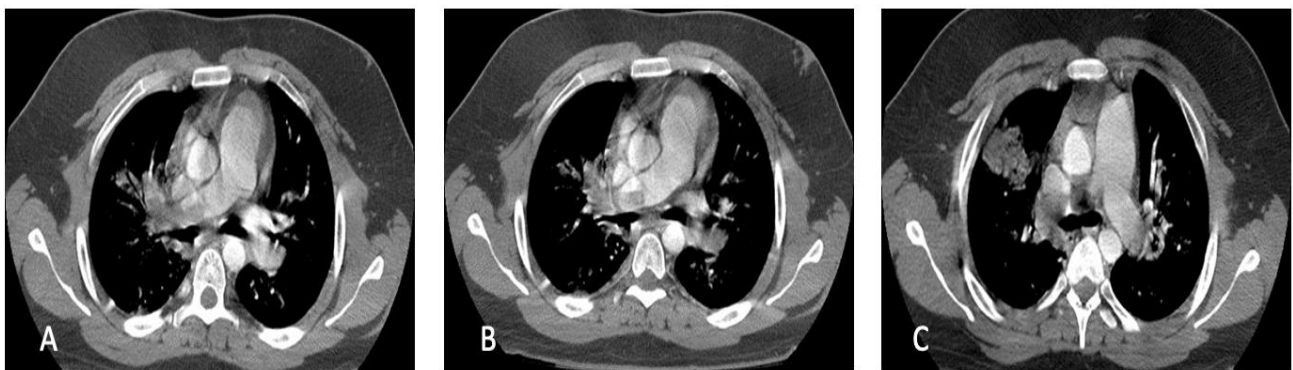


Figure 2: (A, B) An eccentric filling defect is identified in the lumen of the right branch with extension to the superior lobar and interlobar branches with involvement of segmental branches, pulmonary trunk 37 mm, right branch 26.4 mm and left branch 24.2 mm. (C) A concentric filling defect was identified in the lumen of the left branch with extension to the lower lobar branch with involvement of segmental branches

Selective pulmonary angiography showed abundant thrombus loading in the right main branch and occlusion of the upper and middle lobe branches, as well as partial obstruction of the right and left lower lobe branches. Thrombectomy of the right main branch was performed, obtaining a low load of organized thrombus, so bilateral rheolysis was performed with control pulmonary angiography with partial improvement in the thrombus load and finally it was decided to place a device for directed fibrinolysis. When performing the procedure, an initial mean pulmonary arterial pressure (mPAP) of 32 mmHg and a final 40 mmHg was obtained. In a second time, a decrease in thrombus load and permeabilization of pulmonary branches was observed, obtaining mPAP of 21 mmHg.

DISCUSSION

The worldwide prevalence of pulmonary embolism is very high; in the United States alone, 600,000 diagnosed cases are reported per year [5]. In cases of high-risk pulmonary thromboembolism, there are different therapies, one of them is catheter-directed therapy, which aims to rapidly reduce the occlusive thrombus to reduce tension at the level of the right ventricle and thereby improve your prognosis [6]. A meta-analysis carried out in 2014 with the objective of determining whether systemic thrombolysis therapy, compared to targeted therapy, reduced mortality, clinical deterioration and increased risk of bleeding, the results did not demonstrate a significant difference [7]. In targeted thrombolysis, the embedded catheter directly delivers the intrathrombotic fibrinolytic drug and reduces the dose required to achieve adequate clot lysis. The ideal population for this therapy is patients with high-risk thromboembolism in which the infusion catheter can become embedded. EkoSonic catheterization (BTG, West Conshohocken, Pennsylvania) is an alternative infusion catheter that uses integrated ultrasound technology that attempts to improve drug penetration into the thrombus and increase access to fibrin. On the other hand, the AngioJet device is a rheolytic thrombectomy catheter (Boston Scientific), first allowing catheter-directed thrombolysis by injecting thrombolytics by powerful pulses into the thrombus to improve its effectiveness and then eliminating the thrombus mechanically [8, 9].

In this case, selective pulmonary angiography was performed with a 6 FR pigtail catheter in which abundant thrombus load was observed in the right main branch and occlusion of the upper and middle lobe branches, as well as partial obstruction of the branches of the right and left lower lobe. For this reason, in the first instance we proceeded to perform thrombectomy of the right main branch with guide catheters JR 3.5 of 8 FR and JR 3.5 of 7 FR, obtaining a low load of organized thrombus. According to the above, it was decided to perform bilateral rheolysis with the use of an AngioJet device; control pulmonary angiography showed partial improvement in thrombus load. Finally, it was decided to place a device for directed fibrinolysis with an 18 cm catheter that was advanced through the right jugular introducer and positioned in a branch of the middle lobe, where an initial pulmonary artery pressure of 60/14 mmHg with mean pulmonary artery pressure (mPAP) of 32 mmHg and pressure final pulmonary artery of 60/24 mmHg with mPAP of 40 mmHg. Consequently, a pulmonary angiography was performed 24 hours after the procedure, which showed a decrease in the thrombotic load and a reduction in mPAP from 40 mmHg to 21 mmHg, which makes a difference of 19 mmHg compared to the previous one.

The patient was discharged with oral anticoagulation with Rivaroxaban for an indefinite period, in addition to requiring supplemental oxygen on demand. Additionally, we continue with the diagnostic approach for the intentional search for its etiology, so he must be evaluated in a multidisciplinary manner with the internal medicine, rheumatology, pulmonology, angiology, physical rehabilitation and cardiology services.

CONCLUSION

This case shows clinical relevance, due to the high prevalence of pulmonary embolism worldwide, although high-risk pulmonary embolism (shock, right ventricular dysfunction) is the least common form of clinical presentation, its evaluation by angiography highlights is essential in diagnosis, allowing treatment to be individualized. By intervening with this therapy, mPAP improved considerably, favoring the patient's survival and prognosis, and reminds us that individualized therapy is the cornerstone of management in this type of case.

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Conflict of Interest: The authors declare that there are no conflicts of interest at the time of publication of this article.

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