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Massive hemoptysis in a patient with pulmonary embolism, a real therapeutic conundrum

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ABSTRACT

Massive Hemoptysis and pulmonary embolism are two very severe and potentially fatal pulmonary emergencies requiring completely different treatments. We present the case of a 45-year old male transmitted to our Hospital for massive hemoptysis who at the same time was found to suffer from pulmonary embolism. Hemoptysis was treated with bronchial artery embolization which resulted in cessation of haemorrhage and allowed the administration of anticoagulant therapy a few days later. This case report gives an answer on how to manage a real therapeutic conundrum which is the coexistence of a massive hemoptysis and a concomitant pulmonary embolism.

1. Case report

A 45-year-old non-smoker male patient presented to the emergency department of a territorial hospital complaining for hemoptysis. On the day of admission, he reported that he had expectorated approximately 50ml of bright red blood. He denied any other symptoms, including fever, cough, dyspnea or chest pain. On his medical history he reported a similar episode of hemoptysis 5 years ago the cause of which remained unknown despite clinical investigation which included computed tomography (CT) of the chest, immunologic examinations and fiberoptic bronchoscopy. The patient denied any other medical problem and was not receiving any medication.

On physical examination, he was a pleasant apparently healthy man with body temperature 36,8 °C, pulse rate 110 beats/min, blood pressure 130/80 mmHg, respiratory rate 21 breaths/min and oxygen saturation 95% on room air. Auscultation disclosed mild crackles in the right lower lobe. No other abnormal findings were found in the rest of the physical examination. In the laboratory tests, the patient's hemoglobin was 13.1g/dL, hematocrit: 40.7%, white blood cell count was 7410 cells/μL (77.6% neutrophils and 15.1% lymphocytes), and platelet count was 161 000/μL, D-Dimers: 436μg/L (normal values up to 500μg/L) while the values for urea nitrogen, creatinine and electrolytes were within the normal range. Immunologic tests revealed only slightly increased Antinuclear Antibodies (ANA) (1:160). Sputum Gram stain, cultures for common bacteria and examination for M Tuberculosis were negative. ECG was normal.

The patient's chest x-ray on admission, revealed an area of consolidation in the middle lobe. Computed tomography of the chest revealed some bronchiectasis along with an area of consolidation in the middle lobe. The patient was admitted and received oxygen therapy, intravenous amoxycilline-clavulanic acid and intravenous tranexamic acid at a dose of 1 g four times daily.

During the following days, the patient continued to experience streaks of blood in his sputum on a daily basis sometimes accompanied by dyspnea and tachypnea, and 2 days later, a new episode of massive hemoptysis occurred, and the patient was transmitted to our hospital for further evaluation and treatment. On admission to our hospital the patient underwent a CT angiography of the thoracic aorta and its branches (including bronchial arteries) which revealed some mild anatomical abnormalities in the bronchial

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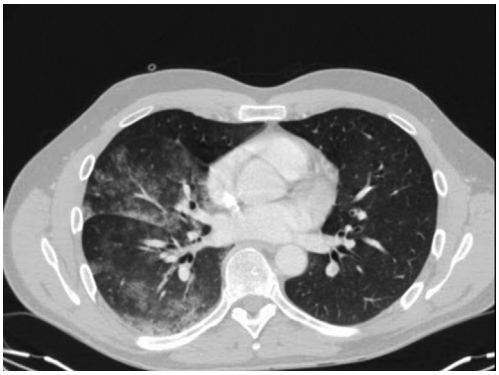

Fig. 1. Chest CT revealing multiple foci of ground glass opacity in the middle and right lower lobe.

arteries suppling the right lower lobe and ground glass opacities in the middle and right lower lobe, without showing a specific bleeding origin (Fig. 1). Although the examination was not sensitive enough, it also gave the impression of a thrombus in the left main artery. Thus, a CT pulmonary angiography was performed which revealed a large thrombus on the left main artery involving the pulmonary arteries for the left upper, the lingual, and the left lower lobe (Fig. 2). An ultrasonography was performed and the presence of a thrombus in the lower extremities and the pelvis was excluded. Echocardiography did not reveal any cardiac abnormalities. Although the leg and pelvis ultrasonography was negative, an inferior vena cava temporary filter (ALN Optional Vena Cava Filter, ALN, France) was placed via femoral approach since anticoangulant treatment was contraindicated. Tranexamic acid was discontinued.

A few hours later the patient experienced a new episode of massive hemoptysis and became severely dyspneic. On clinical examination he was found to be tachypneic, tachycardic and hypotensive. Oxygen saturation had dropped to 78% on room air. An emergency angiography was performed with the aim of embolizing any potential sources of bleeding from the bronchial circulation. Selective angiography from the right bronchial artery revealed extravasation of contrast from three different branches of the middle lobe and embolization was performed using a microcatheter (Progreat®, Terumo, Japan) and *N*-butyl-2-cyanoacrylate (NBCA; Histoacryl®) diluted in a 1:3 ratio, with oily X-ray contrast agent Lipiodol®. Final angiogram demonstrated complete occlusion of the target vessels without any sign of bleeding (Fig. 3). Following this procedure, the patient was stabilized and returned to the ward. Hemoptysis has been ceased.

However, the patient became febrile and developed chest pain in the right hemithorax together with cough and expectoration of dark bloody sputum. Post-procedural chest CT revealed a consolidation of the right lower lobe suggestive of a pneumonia (Fig. 4). High-flow oxygen was administered to achieve target saturation of 94–98%. Blood cultures were collected (their result was available a few days later and they were negative) and antimicrobial therapy was changed to meropenem and linezolide. 3 days after bronchial embolization, the patient's symptoms improved and hemoptysis was completely settled down. The patient received treatment with subcutaneous fondaparinux (in a dose of 7.5mg administered subcutaneous once daily) and underwent monitoring of anti-Xa activity twice a week. The patient was discharged a few days later with the advice to continue treatment with fondaparinux and to return 3 months later for the removal of the inferior vena cava filter. By that time his symptoms had disappeared and he had remained free of hemoptysis. Follow up chest CT demonstrated complete resolution of the consolidation and no other signs of parenchyma disease.

2. Discussion

This patient was a real therapeutic conundrum since he had developed at the same time two very severe and potentially fatal pulmonary emergencies: persistent major hemoptysis and concurrent acute pulmonary embolism (PE). Anticoagulation is required to prevent further thrombosis while, simultaneously anticoagulation is contraindicated in the case of hemoptysis since it increases the risk of bleeding.

Hemoptysis might be the presenting symptom in numerous diseases with an associated mortality 7–30% [1]. Massive hemoptysis, (defined as the expectoration of blood volumes 100–1000 ml per day in different studies) is a potentially fatal complication mainly due to obstruction of the airways, as the anatomical dead space of the major airways is approximately 100–200ml. Bleeding from the bronchial arteries is the most usual origin (90% of cases) of massive hemoptysis as it is a circulation at systemic pressure [1]. The main causes of hemoptysis are reported on Table 1 [1]. The precise localization of the bleeding site is essential for the decision and direction of definitive treatment. Imaging studies such as Chest X-Ray (CXR) and CT scans are very useful in the identification of possible causative lesions of massive hemoptysis. The use of contrast may also help to identify possible vascular malformations. CT angiography is very useful for the detection of the site of haemorrhage and the detection of the possible causes related with hemoptysis. The investigation should be performed in deep inspiration and coverage should include the area between the lung apices to the hilum of the kidneys, from the supra-aortic vessels to

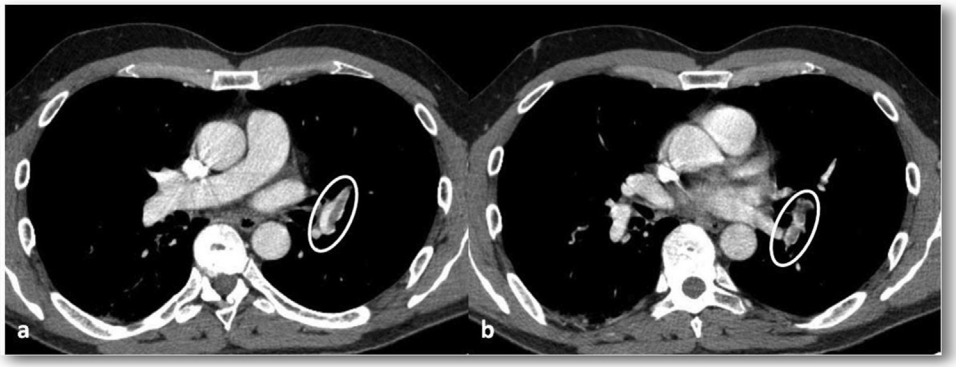

Fig. 2. CT pulmonary artery angiography detected thrombus within segmental branches of the left pulmonary artery (circles).