Case Report

A Young Woman with Syncope, Dyspnea and Abdominal Pain

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We present the case of a 28-year-old woman admitted to our department with respiratory distress, profound hypotension, and tenderness in the left upper abdominal quadrant and left calf. Ultrasound examination revealed left lower extremity thrombus as well as a floating thrombus in the right atrium attached to a patent *foramen ovale*. Spiral computed tomography revealed bilateral pulmonary artery embolization, while an abdominal computed tomographic scan disclosed spleen infarction due to a paradoxical embolism through the patent *foramen ovale*.

Pulmonary embolism is uncommon in young women.[1] Here we describe an unusual case of deep venous thrombosis in a young, otherwise healthy woman, which led to massive pulmonary embolism and paradoxical embolization to the spleen.

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Case presentation

A 28-year-old female was admitted to our department because of a syncopal episode while standing, shortness of breath and upper left abdominal pain. Her past medical history was unremarkable. She had been taking only third-generation oral contraceptives (drospirenone and ethinyl estradiol) for a year and smoked 30 cigarettes/day for 10 years. She did not use alcohol or illicit drugs. In the emergency ward the patient was in acute distress, her blood pressure was 75/45 mmHg and respiratory rate 31 /min. Her pulse rate was 125 beats/min, and the temperature was 37.1° C. Examination of the skin revealed mild cyanosis. Heart auscultation revealed regular rate and rhythm with an accentuated second heart sound. No gallops, murmur or rubs were detected. The lungs were clear. On palpation, there was tenderness in the upper left abdominal quadrant and left calf. Arterial blood gas analysis showed: pH 7.49, pCO_2 21 mmHg, pO_2 44 mmHg, and O_2Sat 80%, while the patient was breathing ambient air. The ECG showed sinus tachycardia and troponin I was within normal limits in serial determinations. In contrast, brain natriuretic peptide on admission was 350 pg/ml (normal range <100 pg/ml) and d-dimers >5000 ng/ml (normal range 50-450 ng/ml).

The patient was admitted to the intensive care unit, where a bedside transthoracic echocardiogram was remarkable for a mobile mass with the characteristic popcorn-like appearance of a thrombus, partially attached to the *foramen ovale* area (Figure 1) and floating in the right atrium. The right ventricle was moderately enlarged and hypokinetic except for the apex, where contraction appeared normal. The interventricular septum was quite flattened in systole. Moderate tricuspid regurgitation was also present, with an estimated right ventricular systolic pressure of 55 mmHg. Lower extremity venous Doppler ultrasound revealed a thrombus in the left popliteal vein. With the diagnosis of massive pulmonary embolism (PE) with hemodynamic instability, secondary to deep venous thrombo-

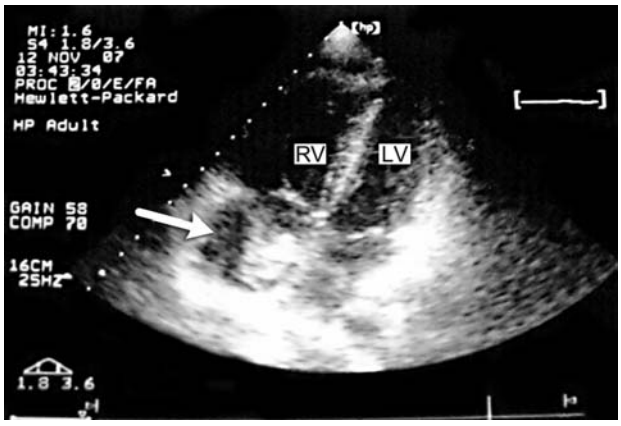

Figure 1. Transthoracic echocardiogram, modified four-chamber view, showing a right atrial mass attached to the *foramen ovale* region (black arrow);

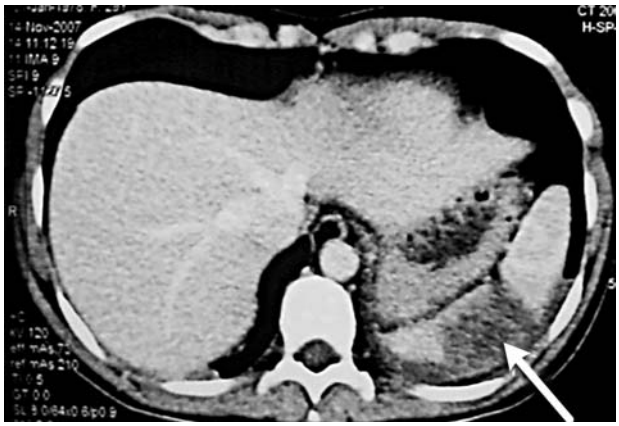

Figure 2. Abdominal computed tomographic scan revealing a low attenuation area in the spleen suggestive of infarct (white arrow).

sis, intravenous thrombolysis with reteplase was administered (10 U bolus dose followed by a second 10 U bolus dose 30 minutes later). Within 30 min after thrombolysis, the patient's symptoms improved and her blood pressure rose to 100/60 mmHg. A transthoracic echocardiogram 1 hour after thrombolysis was not able to detect right atrial thrombus, while right ventricular systolic pressure fell to 40 mmHg. On the following day the patient was hemodynamically stable and her blood oxygen saturation rose to 98% while she was breathing via a 35% O_2 mask. However, the tenderness in her upper left abdominal quadrant became more profound. A spiral computed tomographic (CT) angiography of the lungs revealed multiple emboli in the periphery of both pulmonary arteries, while an abdominal CT scan revealed a low attenuation area in the spleen suggestive of infarct (Figure 2). Subsequently, transesophageal echocardiography with a bubble-contrast study exposed a moderate shunt during the Valsalva maneuver through a patent *foramen ovale* (PFO). A thorough laboratory investigation for thrombophilia (i.e. deficiency of antithrombin III, protein C and S, mutations of prothrombin G20210A and factor V Leiden, as well as the presence of anticardiolipin antibodies and lupus anticoagulant) produced no notable results.

Discussion

This is an unusual case of deep venous thrombosis in a young, otherwise healthy woman, followed by massive PE and paradoxical embolization to the spleen, in the absence of any congenital predisposition to thrombosis. As already mentioned, PE is uncommon in young females.[1] In the case presented here, oral contraception and smoking were recognized as the only factors related to thrombosis.[1,2]

The treatment of this patient included, apart from supportive measures, intravenous thrombolysis. Unless absolutely contraindicated, thrombolysis should be given to all patients with recent (≤14 days) massive PE who present with shock. In patients with right-sided mobile thrombi a fatal outcome is reported in up to 35-42% of cases.[1,3] In those presenting with shock, thrombolysis often achieves an impressive and almost immediate clinical benefit as well as a survival benefit.[4] In addition, it also seems to decrease the incidence of thromboembolic pulmonary hypertension in the long term.[1]

In the case presented here, thrombolysis turned out to be lifesaving for our patient, improving hemodynamics and blood flow into the main pulmonary trunks. It is also of interest that the right atrial thrombus disappeared shortly (approximately 1 hour) after thrombolysis. Right heart thrombi are observed in 4-18% of patients with PE and clot disappearance has been detected in 50% of cases within 2 hours of thrombolysis.[5]

PFO has been recognized as the most common intracardiac defect. This potential communication between the venous and arterial circulations can allow thromboembolic material to bypass the lungs and enter the systemic circulation. However, paradoxical embolism across a PFO is a rare clinical entity and less than 2% of all cases of systemic arterial embolism are paradoxical.[6] In our case, the increase of right atrial pressure (as a result of pulmonary artery pressure elevation) caused right-to-left shunt through the PFO and, consequently, systemic embolization. Paradoxical embolization in the setting of PE does not seem to ad-

versely affect mortality, although in-hospital complications are more frequently reported.[7-9] We would like to emphasize that in cases of paradoxical embolization, spleen involvement, in itself, is an uncommon event (~3%).[10]

In conclusion, this is a case of an unusual coexistence of PE and paradoxical systemic (splenic) embolization in a patient with deep venous thrombosis. It is emphasized that the combination of smoking with oral contraception may lead to life threatening PE in otherwise healthy individuals and thrombolysis may be lifesaving in patients with massive PE and shock. Finally, PFO is a potential route for systemic embolization in the setting of deep venous thrombosis and physicians should be aware of this clinical entity.

References

1. Task Force on Pulmonary Embolism, European Society of Cardiology. Guidelines on diagnosis and management of acute pulmonary embolism. Eur Heart J. 2000; 21: 1301-1336.
2. Blickstein D, Blickstein I. Oral contraception and thrombophilia. Curr Opin Obstet Gynecol. 2007; 19: 370-376.
3. Barbetseas J, Bratsas A, Brili S, et al. Main pulmonary artery thrombus. Hellenic J Cardiol. 2008; 49: 100-101.
4. Kafkas NV, Deboneras CC, Babalis DK. Massive pulmonary embolism and ulcerative colitis. Hellenic J Cardiol. 2008; 49: 365-370.
5. Ferrari E, Benhamou M, Berthier F, Baudouy M. Mobile thrombi of the right heart in pulmonary embolism: delayed disappearance after thrombolytic treatment. Chest. 2005; 127: 1051-1053.
6. Guo S, Roberts I, Missri J. Paradoxical embolism, deep vein thrombosis, pulmonary embolism in a patient with patent foramen ovale: a case report. J Med Case Reports. 2007; 1: 104.
7. Kasper W, Geibel A, Tiede N, Just H. Patent foramen ovale in patients with haemodynamically significant pulmonary embolism. Lancet. 1992; 340: 561-564.
8. Kostadima E, Zakynthinos E. Pulmonary embolism: pathophysiology, diagnosis, treatment. Hellenic J Cardiol. 2007; 48: 94-107.
9. Ganado CC, Felice H, Aquilina O, et al. Atrial fibrillation following transcatheter closure of patent foramen ovale. Hellenic J Cardiol. 2008; 49: 59.
10. Loscalzo J. Paradoxical embolism: Clinical presentation, diagnostic strategies, and therapeutic options. Am Heart J. 1986; 122: 141-145.