Case Report

Pulmonary Artery Thrombus Thrombolysed WITH Reteplase

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ABSTRACT We present the case of a 70 years old woman, admitted in Craiova Cardiology Center for repeated fainting, hypotension, thoracic discomfort and cough, which appeared suddenly the same day. The clinical exam showed: cold, pale, sweated skin, tachypnoea, tachycardia, a diastolic murmur in the third intercostal space near the sternum edge, a third degree systolic murmur above the lower sternum, and a blood pressure of 80/60 mmHg. The electrocardiogram showed signs of right ventricular overload. Emergency echocardiography revealed a hypoechoic thrombus in the right pulmonary artery, of 33/15 mm, mobile, starting from the origin of the artery, with a remaining free lumen of 15-20% and a hypoechoic thrombus in the right common femoral vein. We decided to administer Reteplase (two boluses of 10 U at 30 minutes), with immediate favorable evolution. The echocardiography repeated at 24 hours showed the persistent thrombus in the right pulmonary artery, but with smaller dimensions, and a free lumen of 60%.

KEY WORDS *echocardiography, acute pulmonary embolism*

Introduction

Acute pulmonary embolism is a frequent, underdiagnosed, condition that has unpredictable evolution and reserved prognosis. It is one of the major cardiovascular emergencies, potentially lethal, with the mortality reaching 30% in untreated patients; with treatment, it can be lowered to 2-8%.

Acute pulmonary embolism is a difficult diagnosis, and it is based on suggestive clinical presentation (risk factors, dyspnoea, cyanosis, low oxygen saturation, cardiac decompensation without apparent reason, etc), some simple investigations (EKG, chest X-ray, echocardiography, plasma D-Dimer dosing) and complex, but expensive and with limited use, imaging techniques (CT-scan, scintigraphy, angiography, etc).

Case report

We report the case of a 70 years old woman, admitted in Craiova Cardiology Center for repeated fainting, collapse (blood pressure lower than 80/60 mmHg, not corrected after 2500 ml of iv saline), thoracic discomfort and cough, symptoms that started suddenly the day of the admission.

The patient was known with arterial hypertension form 1986, had had an episode of paroxysmal atrial fibrillation, and deep vein thrombosis of the right calf in 2005. An echocardiographic exam in 2006 noted an ascending aorta aneurism.

She had been treated with Betaxolol 20 mg/day, Amlodipine 5 mg/day, Indapamide 1.5 mg/day, Trimetazidine 35 mg x 2/day, Acenocumarol (stopped in the last three days). She was also treated for a severe depression (Olanzapine, Trazodone, Alprazolam).

The clinical exam in the emergency room showed a patient with pale, cold and wet skin, tachypnoea without orthopnoea, no pulmonary rales. The heart rate was 90 bpm, there was a discrete diastolic murmur in the third intercostal space on the left sternum edge, a grade III systolic murmur in the tricuspid area, with an increase in intensity with inspiration. The blood pressure was 80/60 mmHg.

The electrocardiogram at admission showed (figure 1): sinus rhythm with a rate of 90 bpm, QRS axis at -45°, incomplete right bundle branch block, negative T waves in D_{II}, D_{III}, aVF, V_1-V_4, with the amplitude decreasing from V_1 to V_4, corrected QT interval of 476 ms.

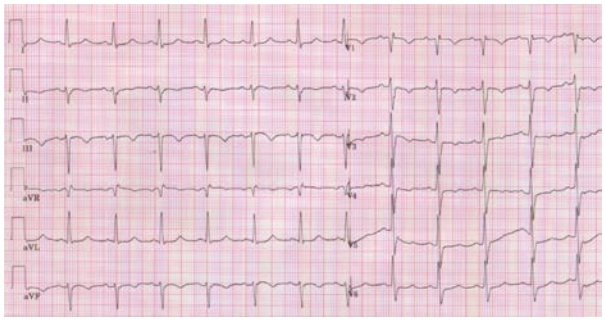

Figure 1. The electrocardiogram at admission.

In these conditions, in an elderly patient, with coronary artery disease risk factors, with an aneurism of the ascending aorta and prior deep vein thrombosis, presenting with chest pain and hypotension, we must consider for differential diagnosis cardiovascular diseases with acute hemodynamic alteration; in this case, we included acute coronary syndrome, aortic dissection, pericardial tamponade, and acute pulmonary embolism.

Emergency laboratory tests revealed: D-Dimer = 0.94 μg/dl, INR = 1.8, glycaemia = 162 mg/dl, Na^+ = 138 mmol/l, K^+ = 4.1 mmol/l, SaO_2 = 87%, TnT (troponin T) < 0.1 ng/ml (excluding significant myocardial necrosis).

Emergency cardiovascular assessment must include a 12-lead EKG, chest radiography, biological markers (myocardial necrosis enzymes, D-Dimer, NT-proBNP) and, with major importance, the transthoracic echocardiography for structural and functional cardiac evaluation. A rapid ultrasound examination can offer essential information and determine the choice of specific therapeutic approaches, influencing the patient's survival.

The transthoracic echocardiography at patient's admission revealed the following data (table 1).

Table 1. Transthoracic echocardiography

Ao at origin = 27 mm, ascending Ao = 52,6 mm, Ao at crosa = 40 mm, descending Ao = 27 mm, abdominal Ao = 23 mm (recalibration of the Ao after the origin of the left subclavian artery)
LA compressed by the Ao
Third degree aortic regurgitation
IVS = 18,6 mm, PW = 16 mm
LVEF = 45-50%
Paradoxal movement of IVS, RV hypokinesis
RV = 52 mm, RA = 60 mm
Severe tricuspid regurgitation (IV degree)
PAPs = 41 + 20 = 61 mmHg
II degree pulmonary regurgitation
Hypoechoic thrombus in the right pulmonary artery, of 33/15 mm, mobile, starting from the origin of the artery, with a remaining lumen of 15-20%
Ao – aorta, LA – left atrium, IVS – interventricular septum, PW – posterior wall of the left ventricle, LVEF – left ventricular ejection fraction, RV – right ventricle, PAPs – systolic pulmonary artery pressure.

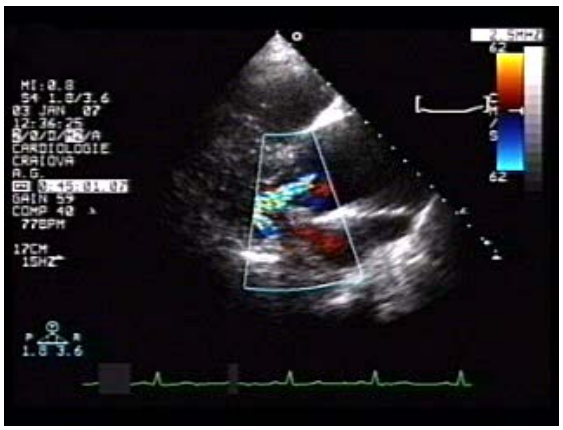

Figure 2. Transthoracic echocardiography – the dilation of the ascending aorta, with a third degree aortic regurgitation.

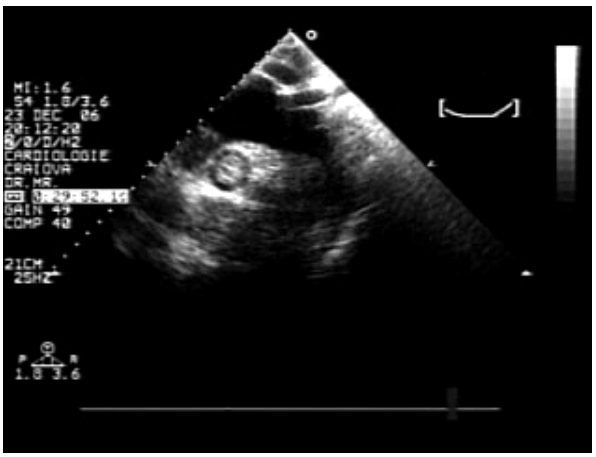

Figure 3. Transthoracic echocardiography, suprasternal incidence showing dilated aortic crosa, without dissection, and a hypoechoic thrombus in the pulmonary artery.

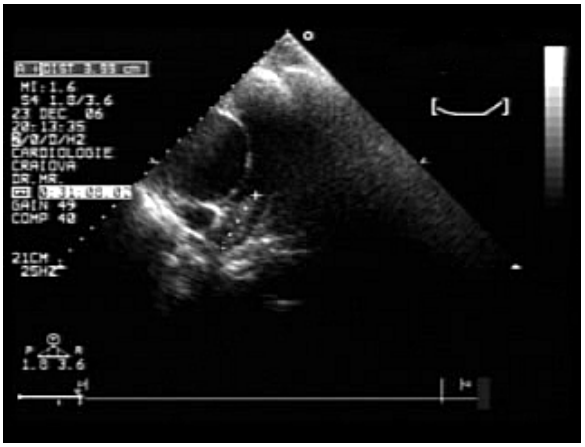

Figure 4. An image from another incidence, with the measurement of the thrombus.

With the known ascending aorta aneurism and the significant aortic regurgitation, the most feared diagnosis, that had to be excluded, was that of aortic dissection. A careful examination, using all ultrasonic windows, guided by the clinical

thinking, can direct us to the correct diagnosis. In this case, the ultrasound exam inclined the diagnosis towards that of acute pulmonary embolism. The direct evidence of the thrombus in the pulmonary artery or one of its branches is rare in clinical practice. In this case, a good suprasternal window permitted this, and excluded the aortic dissection, with decisive therapeutic consequences.

In patients with acute pulmonary embolism, we must search for the origin of the thrombus, which in many cases is located in deep veins of the lower limbs. In our case, we identified a hypoechoic (fresh) thrombus in the right common femoral vein (figure 5).

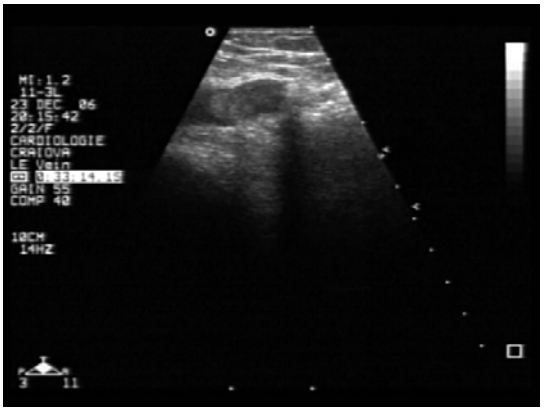

Figure 5. Thrombus in the right common femoral vein.

As recommended by the European Society of Cardiology (Torbicki et al., 2008), the management of high-risk acute pulmonary embolism (with hypotension or shock) is centered by thrombolysis or invasive methods of disobstruction, supported by other measures (hemodynamic support, anticoagulation).

We administered Reteplase 10 U bolus repeated at 30 minutes and unfractioned Heparin starting with 1000 u/h (adjusted by APTT value). In the first hours, we also used Clopidogrel 300 mg, Aspirin 150 mg, intravenous Saline 2000 ml, Famotidine 40 mg and Furosemide 20 mg.

The result was a rapid improvement of the patient's status. After a few hours the patient was slightly tachypnoeic, but with SaO_2 = 90%, heart rate = 70/min and blood pressure of 120/80 mmHg.

The ultrasound reassessment at 24 hours showed the persistence of the thrombus in the pulmonary artery, but with smaller dimensions, with a remaining lumen of 60% (initially it was 15-20%).

The laboratory exams showed an increase of D-Dimer up to 3.5 µg/dl, an AT III of 80.4% (antithrombine III, normal = 80-120%). Protein C, Protein S, Leiden V Factor, Anticardiolipin antibodies were not available.

The chest radiography showed an indirect sign of pulmonary embolism (elevation of the right hemidiafragm).

The patient refused transthoracic echocardiography. Computed tomography, pulmonary scintigraphy or angiography were not available.

The patient was treated with unfractioned Heparin three days, then Enoxaparin 60 mg iv/12h and Acenocumarol, Clopidogrel 75 mg/day, Aspirin 75 mg/day, Sulodexide 600 LSU iv/day, Ramipril 5 mg/day, then 10 mg/day, Ivabradine 5 mg x 2/day, Carvedilol 6.25 mg x 2/day, then 12.5 mg x 2/day, Atorvastatine 40 mg/day, Spironolactone 50 mg/day, Furosemide 20 mg/day.

The treatment at discharge included: Carvedilol 12.5 mg x 2/day, Amlodipine 10 mg /day, Spironolactone 50 mg/day, Furosemide 20 mg/day, Sulodexide 250 LSU/day, Acenocumarol 1 mg/day (target INR of 2-2.5).

Discussion

Transthoracic echocardiography has a major importance in the diagnosis and risk stratification of acute pulmonary embolism (table 2 and 3, figure 6), especially in emergency situations, and when the computed tomography exam is not possible.

The typical echocardiographic expression of acute massive pulmonary embolism includes:

- hypokinetic, dilated right ventricle;
- a ratio of RV/LV > 1;
- increased velocity of the tricuspid regurgitation (3-3.5 m/s);
- dilatation of pulmonary arteries;
- turbulent Doppler flow in the outflow tract of the right ventricle;
- dilatation of inferior vena cava.

Table 2. Principal markers useful for risk tratification in acute pulmonary embolism

Clinical markers	Shock Hypotension
Markers of RV dysfunction	RV dilatation, hypokinesis or pressure overload on echocardiography RV dilatation on spiral computed tomography BNP or NT-proBNP elevation Elevated right heart pressure at catheterism
Markers of myocardial injury	Cardiac troponin T or I positive

Table 3. Risk stratification according to expected pulmonary embolism-related early mortality rate

Mortality risk		Risk markers			Treatment implications
		Clinical (shock or hypo-tension)	RV dys-function	Myocardial injury	
High (> 15%)		+	+	+	Thrombolysis or embolectomy
Non-high	Intermediate (3-15%)	-	+	+	Hospital admission
			+	-	
			-	+	
	Low (<1%)	-	-	-	Early discharge or home treatment

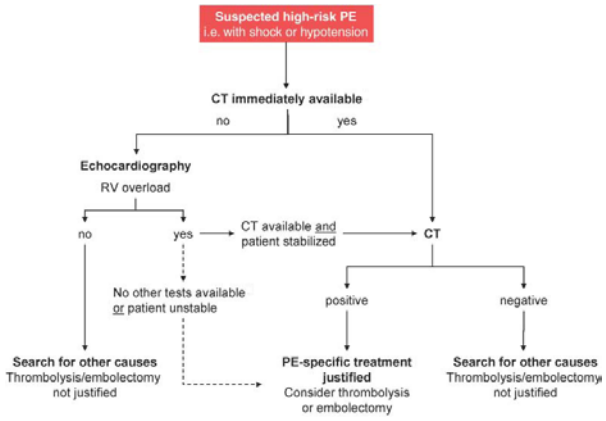

Figure 6. Practical algorithm in high-risk acute pulmonary embolism.

More specific signs are:

– hypokinesia of the right ventricle that does not affect the apical segment (sensitivity 77%, specificity 94%) (McConnell et al., 1996)
– the pattern of the ejection flow of the right ventricle (acceleration time < 60 ms) (sensitivity 48%, specificity 98%) (Torbicki et al., 1999)

Elements of (quasi)certitude are the identification of thrombi in the right heart or inferior vena cava, deep vein thrombosis, thrombi in the pulmonary arteries.

A hemodynamically significant acute pulmonary embolism is unlikely in the presence of a normal echocardiography.

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