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Case report

A case report of an acute postoperative pulmonary thromboembolism

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Abstract Pulmonary embolism (PE) is a disease that can lead to sudden cardiac death and in many patients, PE is the result of deep vein thrombosis (DVT). Surgical interventions are a significant risk factor for VTE and are the most common cause of immediate postoperative death. The paper presents a case report of a diagnosis and treatment algorithm applied in a patient who developed acute, pulmonary thromboembolism in an early, postoperative course. An acute, pulmonary thromboembolism has been diagnosed using modern diagnostic tools, according to the recommendations of the European Association of Cardiologists 2019 for the diagnosis and treatment of patients with pulmonary thromboembolism. In the acute phase in our patient, thrombotic masses in the right heart chambers were verified, fibrinolytic therapy with satisfactory therapeutic effect and no side effects was applied. The prognostic evaluation, which is also important in the further evaluation of the patient, was performed at the same time as the diagnosis of pulmonary thromboembolism and risk stratification based on the most common scoring system - the PESI index.

Kew words pulmonary thromboembolism, surgical interventions, fibrinolytic therapy

Introduction

Venous thromboembolism (VTE) is a clinical syndrome that includes deep vein thrombosis (DVT) and pulmonary embolism (PE). In terms of frequency, this disease ranks third among cardiovascular diseases, and annually, about 100-200 people in 100,000 people experience pulmonary thromboembolism (1). Pulmonary embolism (PE) is a disease that can lead to sudden cardiac death. It is caused by obstruction of the smaller or larger branches of the pulmonary artery, most commonly by thrombus, rarely by air embolus, adipose tissue, tissue particles, and amniotic fluid. Knowledge of risk factors is important in determining the likelihood of PE. Unfortunately, causing risk factors can not be identified in even 40% of patients with pulmonary embolism (2, 3). Surgical interventions, leg fractures, or replacement of the wrist with artificial, as well as spinal cord injuries are well known predisposing factors for VTE. The diagnosis is quite difficult and is only made in 50% of patients. Diagnostic evaluation in patients with suspected pulmonary embolism begins with an assessment of the likelihood of an event, which is performed by applying clinical rules known as the Vells' Rules and the Revised Geneva scoring system (4).

Case presentation

Male patient, 61 years old, admitted on May 18, 2018 to the Coronary Unit of the Niška Banja Institute for serious suffocation. This is a patient who underwent left leg amputation surgery on April 27, 2018 as a result of a chronic complication of prolonged diabetes mellitus. After six days of hospital treatment, he was discharged home without any anticoagulant therapy. Among the risk factors for cardiovascular disease are hypertension, hyperlipidemia, diabetes, obesity and a positive family history. On admission, an ECG was performed showing a sinusoidal rhythm, HR 102 bpm, S1Q3T3, ST segment elevation up to 1mm in D3 lead, incomplete right branch block (Figure 1).

On admission he was dyspneic, tachypnoic, with skin and visible mucous membranes pale in color, irrigated with cold sweat, SaO2 on admission was 62%; auscultatory lung finding: with no arrest; auscultatory heart finding: rhythmic action, tachycardia, BP=140/70mmHg, HR= 104 bpm; liver was palpable 3-4 cm below the right costal margin; pretibial swelling of the right lower leg, amputated left leg, bandaged stump. The patient was immediately suspected of pulmonary thromboembolism based on the clinical presentation, predisposing risk factors and the presence of ECG changes. Based on current European Guidelines for the diagnosis and treatment of acute pulmonary thromboembolism 2019, we used the Geneva score system, which showed that a clinical diagnosis of PTE was plausible (3 points: within one month surgery and heart rate> 95 bpm; Table 1). Upon admission, a laboratory was made that showed elevated BNP and D-dimer values (BNP was 2,420, TnI level - negative, DDIM 2900).

We also performed an initial risk assessment in patient with PTE, which is necessary and begins immediately after the suspicion of the disease and the start of diagnostic treatment is important not only for intrahospital prognosis and 30-day mortality, but also for the choice of therapeutic modality (Table 2) . Because our patient was hemodynamically stable, he was classified as not at high risk.

The therapy was started immediately (oxygen therapy, low molecular weight heparin - enoxaparin 1mg/kg body weight at 12h, antibiotic therapy (ceftriaxone 2g/24h), cardiotonic agents, bronchodilators, diuretics, strictly dosed infusion solutions. Echocardiogram (ECHO) performed on admission day revealed significant enlarged right chambers (Mc Connell's sign - positive). He was rhythmically and hemodynamically stable from admission. MSCT of pulmonary arteries was performed on May 21, 2018. MSCT showed thrombotic mass lodged in the bifurcation of the pulmonary trunk with extensions into both main pulmonary artery branches. Thrombotic masses were also seen in all lobar and segmental branches of the pulmonary artery. Conclusion: massive pulmonary thromboembolism. Follow-up ECHO was performed on

Table 1. Clinical rules for the prediction of pulmonary thromboembolism

Clinical rules for the prediction of pulmonary thromboembolism		
	Clinical assessment / scores	
Revised Geneva Score	Originally version	Simplified version
Previous DVT or PE	3	1
Heart rate		
75-95 bpm	3	1
≥ 95 bpm	5	2
Surgery or fracture within a month	2	1
Hemoptysis	2	1
Active cancer	2	1
Unilateral lower extremity pain	3	1
Localized tenderness along the distribution of the lower extremity deep venous system and one-sided swelling	4	1
Age >65 years	1	1
Clinical probability		
Three levels score		
Low	0-3	0-1
Moderate	4-10	2-4
High	≥11	≥5
Two levels score		
Low probability for PE	0-5	0-2≥
PE probable	≥6	≥3

Figure 1. Admission ECG

Figure 2. ECHO of thrombotic mass in the right atrium

Table 2. Classification of pulmonary embolism severity and risk of premature death (in hospital or 30 days)

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥1	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
High		+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

hospital Day 3 and revealed EFLV 60%, enlarged right chamber and, for the first time, verified striated, hyperechogenic structures (thrombotic masses - Figure 2) in the right atrium, which are fixed at the base for the interatrial septum and during the diastole prolapsed through the tricuspid orifice into the right ventricle cavity.
The patient remains rhythmically and hemodynamically stable. In the morning of the Treatment Day 4, the general condition of the patient worsens, with a blood pressure drop that soon becomes immeasurable followed with hypoxia, the patient becomes pale, flushed with cold sweat, and the decision to use fibrinolytic therapy was made, although the patient was amputated 23 days earlier; left leg was amputated above the knee (Actilisa /INN: alteplase/ 100 mg for 120 minutes). After administration of thrombolytic therapy, the patient was stabilized with introduced unfractionated heparin and warfarin therapy. On May 31, 2018, the patient was discharged as stable condition and, with conventional cardiology therapy, he received warfarin prescription.

Discussion

Venous thromboembolism (VTE) is a clinical syndrome that includes deep vein thrombosis (DVT) and pulmonary embolism (PE). In terms of frequency, this disease ranks third among cardiovascular diseases, and annually, about 100-200 people in 100,000 people experience pulmonary thromboembolism[1]. The predisposing factors for the occurrence of VTE are numerous, and they may be related to the patient himself or related to external factors. Injuries, Surgical interventions, leg fractures, or replacement of the wrist with artificial, as well as spinal cord injuries are well known predisposing factors for VTE. The use of hormone therapy in fertile women, pregnancy and puerperium, malignancies also carry the risk of VTE, and haematological malignancies have the highest thromboembolic potential. The most important predisposing factor is acquired or congenital thrombophilia. Various registries of patients who had an episode of VTE or PE during hospitalization showed that after 30 days of discharge, the overall mortality was between 9% and 11%, and after 3 months, between 8.6% and 17%[5]. Earlier studies revealed that the proportion of patients with early recurrent episodes of VTE (who were on anticoagulant therapy) increased over time, being 2% after two weeks, 6.4% after three months, and 8% after 6 months. More recent studies suggest that the highest incidence of recurrent PTE is highest within 2 weeks of discharge and declines over time. In that early period, the presence of cancer or the inability to achieve an adequate level of anticoagulant care are undoubtedly the most important predictors of an increased risk of recurrent VTE.
Later occurrence of recurrent episodes of VTE (after 6 months or after discontinuation of anticoagulant therapy) occurs in 13% of patients after one year, in 23% of patients after 5 years, and in 30% after 10 years. Factors associated with subsequent, recurrent VTE episodes are: years, male gender, family PTE, and increased body mass index. Elevated D-dimer levels, either during or after discontinuation of anticoagulant therapy, are an independent prognostic factor for late, recurrent thromboembolism[6]. Initial assessment, which depends on the patient's clinical status and its comorbidities, is very important before treatment of PE patients (Table 1). Patients with suspected PE who are in shock or have hypotension are classified as high-risk patients. They require an immediate diagnostic approach, and if the diagnosis confirms the use of pharmacological (or alternatively, surgical) reperfusion therapy. Other patients belong to the category of moderate or low risk, and they are scored (usually according to the PESI or sPESI score) after the diagnosis, to determine the risk level. Patients with PESI ≥3 or with PESI≥1 belong to the intermediate risk category. If there is right ventricular dysfunction and an increase in cardiac biomarkers (especially troponin), it is intermediate-high risk, and if only one of these two parameters is positive, intermediate-low risk7. The association of thrombotic masses in the right heart chambers and pulmonary thromboembolism is, in most cases, extremely emergency regarding the administration of therapy. These patients belong to the group of high-risk patients. The prevalence of thrombotic masses in pulmonary thromboembolism is 4% -18%[8,9] and is associated with an increase in mortality. The therapeutic option includes surgical thrombectomy in well-equipped centers or drug thrombolysis and anticoagulant therapy[8,9,10,11].
Thrombolytic therapy in these situations is the fastest and most appropriate therapeutic treatment in most situations[12]. Treatment of high-risk patients with PE involves the use of thrombolytic drugs, unless contraindications exist, together with anticoagulant medicines. If contraindications exist for the use of thrombolysis then surgical embolectomy should be considered. In intermediate- and low-risk patients in the acute phase, treatment consists in the administration of NMH or pentasaccharide, fondaparinux, together with new, non-vitamin K drugs (dabigatran, rivaroxaban, apixaban, and edoxaban)[1,13].

Conclusion

The diagnosis of PTE is a great challenge, because classic symptoms are not present in many cases. In order to make a diagnosis, it is crucial in the initial diagnostic step to suspect this disease, especially if there are well-known predisposing risk factors for PTE. Strong risk factors for deep vein thrombosis, and therefore pulmonary embolism are major trauma, surgery, low extremity fractures, artificial hip replacement, and spinal cord injury. Guidelines from the European Association of Cardiology for the Diagnosis and Treatment of Acute Pulmonary Thromboembolism significantly help in the diagnostic algorithm for PTE and the choice of therapy should be put into practice with personalized approach to the patient.

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