

# Massive acute pulmonary embolism in 33-year-old male with low risk factors of venous thrombosis: management according to 2019 ESC guidelines

Masywna zatorowość płucna u 33-letniego mężczyzny z niskim ryzykiem żyłnej choroby zakrzepowo-zatorowej – postępowanie według wytycznych ESC 2019

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## Abstract

We present a case of a 33-year-old obese patient with pulmonary embolism (PE), admitted to the hospital with gradually worsening of dyspnea, general malaise, right lower limb redness and edema. During examination tachycardia (124/min) and hypoxemia (90% SpO<sub>2</sub>) were recorded. Laboratory findings revealed elevated levels of D-dimer, cardiac troponin T and N-terminal pro-B-type natriuretic peptide. Electrocardiography showed clear signs of pulmonary embolism – SIQIIIITIII and T-waves inversion in V1–V5. Diagnosis prediction was strengthened by transthoracic echocardiography, which uncovered signs of right ventricle overload and 60/60 sign. Despite little risk factors of venous thromboembolism (VTE), the patient was assessed to have a high clinical probability of PE according to revised Geneva clinical prediction rule. Predisposing condition to VTE could be past coronavirus disease 2019 infection. Patient was categorized into a group of intermediate-high risk of early mortality, received parenteral anticoagulation with unfractionated heparin and underwent computed tomography pulmonary angiography (CTPA) (class IB), which confirmed the diagnosis in this almost certain case. CTPA can cause many side-effects, including: contrast-induced nephropathy or anaphylaxis, which in such unequivocal situation may be questioned and other, safer methods of PE confirmation could prove their usefulness.

Key words: pulmonary embolism, computed tomography pulmonary angiography, ESC guidelines

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## Introduction

Pulmonary embolism (PE) is a clinical outcome of venous thromboembolism (VTE), incidents of which are getting more common with age, especially among patients older

than 70-years-old [1]. Higher prevalence of VTE in the elderly leads to misdiagnosis in younger patients, while 5–10% of in-hospital deaths are a direct result of PE [2]. Fast and efficient diagnostics and treatment are crucial to save and prolong patient' life. We present a case of a young man,

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a coronavirus disease 2019 (COVID-19) convalescent, with pulmonary embolism and little predisposing factors to VTE [3], whose was treated according to the 2019 European Society of Cardiology (ESC) Guidelines for the diagnosis and management of acute PE [4].

## Case report

A 33-year-old obese [body mass index (BMI) 29 g/m<sup>2</sup>] patient was admitted with dyspnea that had gradually worsened over the last 20 days, with exacerbation to resting dyspnea within last 24 hours. He observed right lower limb reddening and edema few days prior to admission. Measured vital signs were as follows: oxygen saturation of arterial blood (SaO<sub>2</sub>) was 90%, up to 95% passive oxygen therapy, heart rate 124 beats/min (regular), blood pressure 126/76 mm Hg. Laboratory findings revealed elevated levels of D-dimer, cardiac troponin T (cTnT) and N-terminal pro-B-type natriuretic peptide (NT-proBNP) (Table 1). Electrocardiography registered sinus tachycardia 130/min, left axis deviation, SIQIIIITIII sign and T-waves inversion in leads V1–V5 (Figure 1). Transthoracic echocardiography (TTE) showed signs of right ventricular overload – enlarged right ventricular diastolic diameter (RVDD 43 mm), decreased tricuspid annular plane systolic excursion (TAPSE 12–13 mm) and 60/60 sing. Patient scored 12 points in revised Geneva clinical prediction rule for PE and was in high clinical probability group. According to Pulmonary Embolism Severity Index/Simplified Pulmonary Embolism Severity Index (PESI/sPESI) patient had low mortality risk. The computed tomography pulmonary angiography (CTPA) confirmed PE and uncovered saddle pulmonary embolus (Figures 2, 3) and subpleural lesions characteristic for pneumonia attributed to severe acute respiratory syndrome

**Table 1.** Laboratory findings

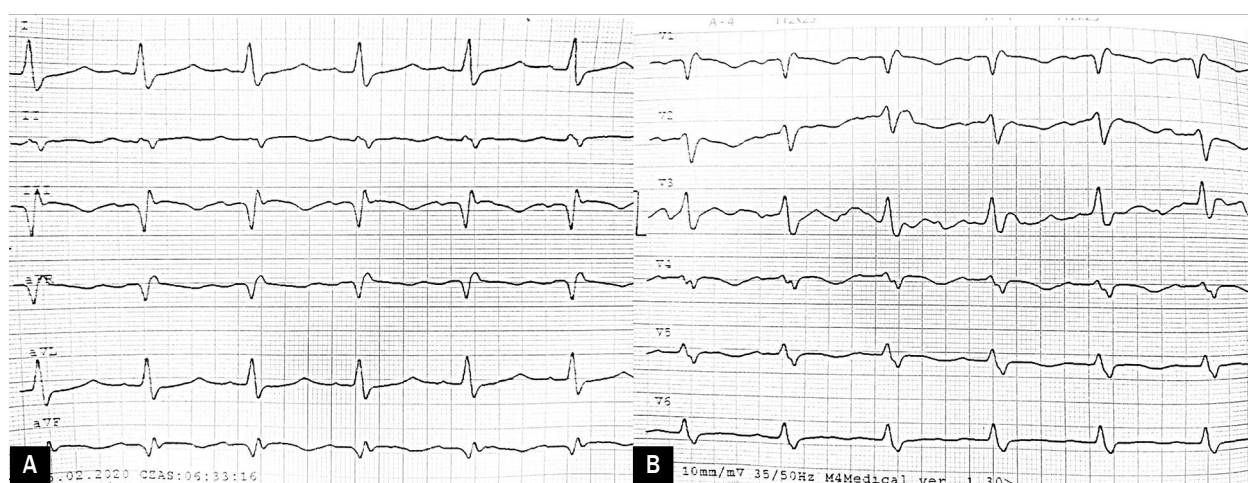
Variable	Date	
	November 21	November 22
D-dimer [mg/L] (< 0.50)	8.09	10.46
NT-proBNP [pg/mL] (< 125.0)	4581.0	-
cTnT [µg/L] (0.009–0.4 µg/L)	43	-
	33	
COVID-19 tests results		November 21–24
RT-PCR SARS-CoV-2	Negative	
SARS-CoV-2 Abbott antigen test	Negative	
IgM SARS-CoV-2 antibodies	Positive COI: 22.1	
IgM SARS-CoV-2 antibodies [AU/mL]	Positive 103	

NT-proBNP – N-terminal pro-B-type natriuretic peptide; cTnT – cardiac troponin T; COVID-19 – coronavirus disease 2019; RT-PCR – reverse transcriptase polymerase chain reaction; SARS-CoV-2 – severe acute respiratory syndrome coronavirus 2

coronavirus 2 (SARS-CoV-2). Serological test confirmed the presence of IgM/IgG SARS-CoV-2 antibodies and further tests, including reverse transcriptase polymerase chain reaction (RT-PCR) test and Abbott's antibody test, excluded active COVID-19 infection (Table 1). Due to stable clinical state without sings of hemodynamic shock, the patient was treated with initial parenteral anticoagulation therapy with unfractionated heparin followed by oral therapy with rivaroxaban.

## Discussion

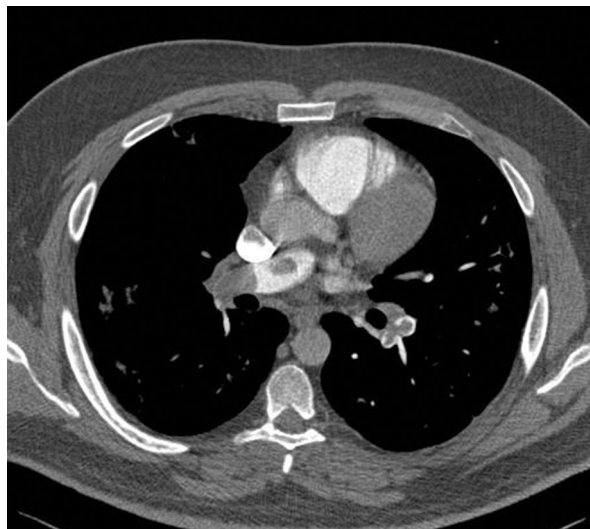
The 2019 ESC Guidelines for diagnosis and management of acute PE have introduced a new standard across the



**Figure 1.** Electrocardiogram (50 mm/s; 1 mV = 10 mm) – sinus tachycardia, left axis deviation, SIQIIIITIII sign, T-waves inversion in precordial leads V1–V5



**Figure 2.** Embolus extending from pulmonary trunk bifurcation to left main pulmonary artery (CTPA)



**Figure 3.** Arterial embolus in right main pulmonary artery (CTPA)

whole Europe. Diagnosis and treatment are strongly tied with PE's clinical probability, indicators of risk and early mortality risk.

The patient developed VTE despite only low predisposing factors for this condition – obesity. Other possible causes of VTE (coagulopathies, autoimmune diseases) cannot be excluded. However, recent COVID-19 infection was confirmed and new studies acknowledged the positive correlation between this disease and VTE incidents [5]. Importance of being placed in intermediate-high risk group of early mortality and earlier mentioned electrocardiographic (ECG) findings relating to disadvantageous short-term outcomes in PE [6] cannot be undermined. According to the guidelines, the patient should undergo the CTPA for diagnosis confirmation (IB recommendation class). In patients with high pre-test PE probability, CTPA positive predictive value was 92–96% [7]. Taking the above into consideration, PE in this patient was almost certain and chances that CTPA's outcome would influence treatment process are slim, as the treatment should be implemented during diagnostic procedures in patients with high clinical probability (class IC). However, according to guidelines, CTPA in this case and among the patients with positive D-dimer is a “must-have” step. There is still the safest way to confirm the diagnosis

in PE suspected patient by using compression ultrasonography (CUS) – class IA, but it was unavailable at the time. Worth mentioning is that computed tomography with contrast exposes the patient to dangerous radiation and other side-effects such as anaphylactic shock or contrast-induced nephropathy[8], which could be easily avoided.

## Conclusion

In the new guidelines, CTPA takes a lead in a race for being a golden standard for confirmation or exclusion of pulmonary embolism. In our case, PE is almost certain based on clinical signs, symptoms, results of ECG, transthoracic echocardiography (TTE) and laboratory tests indicating initial assumption. Still, CTPA had to be performed to confirm clinically nearly certain diagnosis and exposed the patient to potential risk of complications, including contrast-induced nephropathy. Therefore, we should seek another, safer PE confirmation method, especially in such unequivocal situation.

## Conflict of interest

Authors declare no conflict of interest.

## Streszczenie

Zaprezentowano opis przypadku 33-letniego otyłego mężczyzny z zatorowością płucną (PE), przyjętego z powodu stopniowo narastającej duszności, osłabienia oraz zaczerwienienia i obrzęku prawej kończyny dolnej. U pacjenta stwierdzono tachykardię (124/min) i hipoksemię (90% SpO<sub>2</sub>). W badaniach uwagę zwracały podwyższone stężenia D-dimerów, troponiny T i N-końcowego fragmentu propeptydu natriuretycznego typu B. Badanie elektrokardiograficzne wykazało zmiany typowe dla PE – konfigurację SIQIIITIII oraz ujemne załamki T w odprowadzeniach V1–V5. Kliniczne podejrzenie PE dodatkowo potwierdzono w echokardiografii przezklatkowej, w której uwidoczniono cechy przeciążenia prawej komory i objaw 60/60. Mimo słabych czynników ryzyka choroby zakrzepowo-zatorowej (VTE), pacjenta cechowało wysokie prawdopodobieństwo kliniczne PE według skali genewskiej. Warunkiem predysponującym do VTE mogła być przebyta choroba koronawirusowa 2019. Pacjent w obrazie pośrednio wysokiego ryzyka wczesnego zgonu w przebiegu PE otrzymał parenteralnie heparynę niefrakcjonowaną i przebył badanie angiografii płucnej metodą tomografii komputerowej (CTPA) (klasa zaleceń IB), które potwierdziło wcześniejsze przypuszczenia w tym pewnym klinicznie przypadku, narażając chorego na działania niepożądane, głównie związane z podaniem środka kontrastowego, między innymi nefropatię po-kontrastową czy anafilaksję. W opisywanym przypadku CTPA jest metodą z wyboru, która niesie za sobą ryzyko powikłań. Należy poszukiwać nowych metod diagnostycznych lub algorytmów postępowania pozwalających na pewne postawienie diagnozy w przypadkach niebudzących wątpliwości klinicznych.

Słowa kluczowe: zatorowość płucna, angiografia płucna metodą tomografii komputerowej, wytyczne ESC

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