

High-risk pulmonary embolism in a post-COVID 19 female under hormonal contraception

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ESC curriculum 2.2 Echocardiography • 2.4 Cardiac computed tomography • 6.7 Right heart dysfunction • 7.1 Haemodynamic instability • 9.5 Pulmonary thromboembolism

A 29-year-old, nulliparous, non-smoker, overweight (body surface area 1.97 m²; body mass index 29.4 kg/m²) female presented to the emergency room of our hospital for ongoing dyspnoea, tachycardia, and general malaise. She had a recent COVID-19 infection, presenting with mild symptoms (pharyngodynia only), which occurred 4 weeks before and lasted 1 week. Moreover, she had a history of chronic oral contraceptive pill (OCP, levonorgestrel 0.10 mg and ethinylestradiol 0.02 mg daily) use for 6 years. At hospital admission, blood pressure was 90/60 mmHg, heart rate was 132 b.p.m., arterial oxygen saturation was 88%, and body temperature was 36.5°C. Arterial blood gas analysis showed hypocapnia (pCO₂ 27.6 mmHg) and hypoxaemia (pO₂ 66 mmHg) with mild respiratory alkalosis (pH 7.48). The electrocardiogram revealed sinus rhythm with an S1Q3T3 pattern (Figure 1A). A bedside transthoracic echocardiography (TTE) showed saddle pulmonary embolism (PE, Figure 1B), with McConnell's sign (right ventricular free wall akinesis with sparing of the apex) due to severe pulmonary hypertension (tricuspid regurgitation velocity >3.4 m/s). An urgent computed tomography (CT) pulmonary angiography confirmed extensive saddle PE (Figure 1C). Computed tomography venography documented concurrent thrombosis of the left saphenofemoral junction and great saphenous vein (Figure 1D). The estimated Pulmonary Embolism Severity Index score was 119 (Class IV, high 30-day mortality risk, 4.0–11.4%). Accordingly, the patient underwent systemic thrombolysis with a recombinant tissue plasminogen activator (rtPA) 100 mg infusion over 2 h, followed by enoxaparin sodium 6000 IU subcutaneously twice daily. After treatment, she showed a rapid improvement in her haemodynamic and ventilatory patterns, the electrocardiogram quickly normalized, and saddle PE disappeared on TTE (Figure 1E). The further use of OCP was contraindicated, and,

on Day 6 after presentation, the patient was discharged from our institution with the indication of 6 months of anticoagulant therapy with apixaban 5 mg twice a day.

To date, only two authors have described the association between chronic OCP use and venous thromboembolism/PE in the acute phase of COVID-19 disease.^{1,2} Differently from these authors who reported segmental or subsegmental cases of PE in acute COVID-19 patients, we described a case of proximal PE detected during the post-acute phase of COVID-19 disease. Given that during the convalescent phase of COVID-19 disease, a state of endothelial dysfunction, hypercoagulability, and low-grade inflammation may be persistent,^{3,4} it is likely that OCP may have exerted an additive prothrombotic effect on a substrate of chronic immuno-thrombogenicity related to COVID-19 infection.

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Consent: The authors confirm that witnessed verbal consent for submission and publication of this case report including images and associated text has been obtained from the patient detailed in this case report. This has been discussed with the editors.

Ethics approval: This study was conducted in accordance with the World Medical Association Declaration of Helsinki. The local ethics committee decided that ethics approval was not required in a single-case image. No personal identifying information was included in this manuscript.

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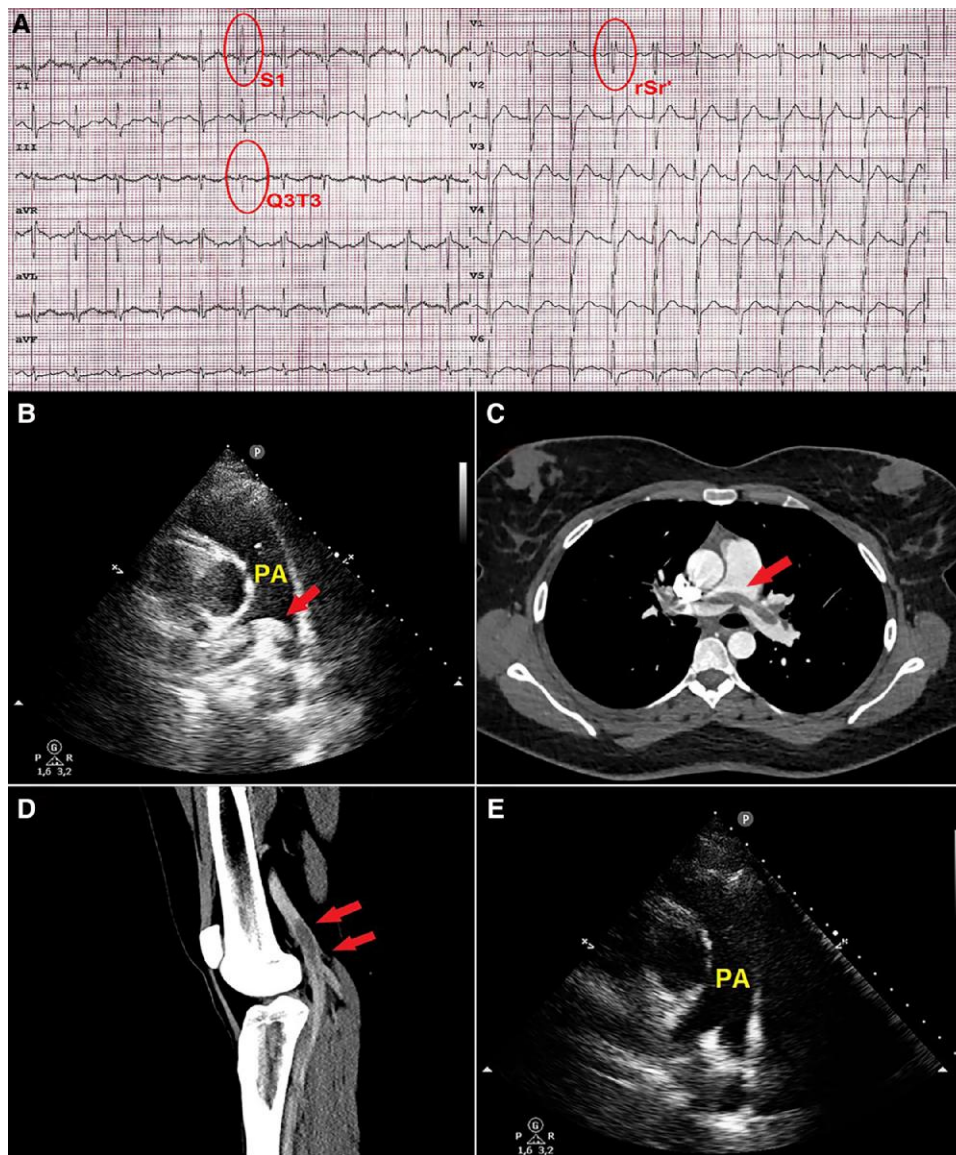


Figure 1 (A) Twelve-lead electrocardiogram, showing mild right ventricular delay and S1Q3T3 pattern, indicative of acute pulmonary embolism. (B) 2D transthoracic echocardiography. Basal short-axis view, demonstrating a saddle pulmonary embolism (arrow) extending in both the right and left pulmonary arteries. PA, pulmonary artery. (C) Axial view of the computed tomographic pulmonary angiography, showing a saddle pulmonary embolism (arrow) extending in both the right and left pulmonary arteries. (D) Computed tomography venography in sagittal reconstruction, showing concurrent thrombosis of the left saphenofemoral junction and great saphenous vein (arrows). (E) Basal short-axis view from transthoracic echocardiography, demonstrating total regression of mobile saddle thrombus after thrombolytic treatment. PA, pulmonary artery.

Data availability

The data underlying this article will be shared upon reasonable request to the corresponding author.

References

1. Fiorini NB, Garagoli F, Bustamante RC, Pizarro R. Acute pulmonary embolism in a patient with mild COVID-19 symptoms: a case report. *Eur Heart J Case Rep* 2021; **5**:ytaa563.
2. Valenzuela-Vallejo L, Corredor-Orlandelli D, Alzate-Ricaurte S, Hernández-Santamaría V, Aguirre-Ruiz JF, Peña-Peña A. Hormonal contraception and massive pulmonary embolism in a COVID-19 ambulatory patient: a case report. *Clin Pract* 2021; **11**: 914–918.
3. Dalan R, Boehm BO. The implications of COVID-19 infection on the endothelium: a metabolic vascular perspective. *Diabetes Metab Res Rev* 2021; **37**:e3402.
4. Fan BE, Umapathi T, Chua K, Chia YW, Wong SW, Tan GWL, et al. Delayed catastrophic thrombotic events in young and asymptomatic post COVID-19 patients. *J Thromb Thrombolysis* 2021; **51**:971–977.