


# Extensive deep vein thrombosis and pulmonary embolism as a unique clinical manifestation of COVID-19 in a young healthy patient

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## Abstract

**Background/Objective:** Deep vein thrombosis and pulmonary embolism have been described as complications in previously diagnosed COVID-19 patients, especially in those admitted in critical ill units, but, to our knowledge, there is no report of venous thromboembolism in an otherwise asymptomatic COVID-19 patient.

**Methods:** We report the case of a 22-year-old female, healthy patient with pulmonary embolism (Pulmonary Embolism Severity Index Score 22 points, low risk) and extensive proximal deep vein thrombosis as a unique clinical manifestation of the new coronavirus disease.

**Results:** The patient had no risk factors and no familial history of venous thromboembolism. All thrombophilia markers were negative. The patient was treated as first by an independent vascular team, performing vena cava filter placement and open thrombectomy. Her symptoms worsened, and after 3 weeks, she underwent US-enhanced thrombolysis and mechanical thrombectomy. She was isolated for 10 days and did not develop any other clinical manifestation of COVID-19 disease. During follow-up, she remained asymptomatic and complete patency of the venous system was achieved. Full oral anticoagulation was conducted for 6 months.

**Conclusion:** COVID-19 appears to be a multi-symptomatic disease, and venous thromboembolism without any other previous described COVID-19 symptom could be considered one of its diverse clinical presentations and RT-PCR for SARS-CoV-2 tests emerge to be mandatory in patients with otherwise unexpected venous thrombosis.

## Keywords

COVID-19, deep vein thrombosis, pulmonary embolism, venous thromboembolism

## Introduction

The SARS-CoV-2 outbreak originated in the Hubei province in Wuhan, China, at the end of 2019 rapidly gained pandemic status and has spread globally, with almost 100 million confirmed cases and over two million deaths worldwide.<sup>1</sup> Clinical features of COVID-19 went beyond a primary pneumonic disease and now there is enough evidence sustaining that SARS-CoV-2 induces thrombosis with a 31% incidence rate in ICU patients.<sup>2</sup> There are several reports and series describing venous thromboembolism (VTE) among symptomatic COVID-19 patients, but to the best of our knowledge, no cases of deep vein thrombosis (DVT) and pulmonary embolism (PE) as a sole presentation of COVID-19 have been reported until now.<sup>3</sup>

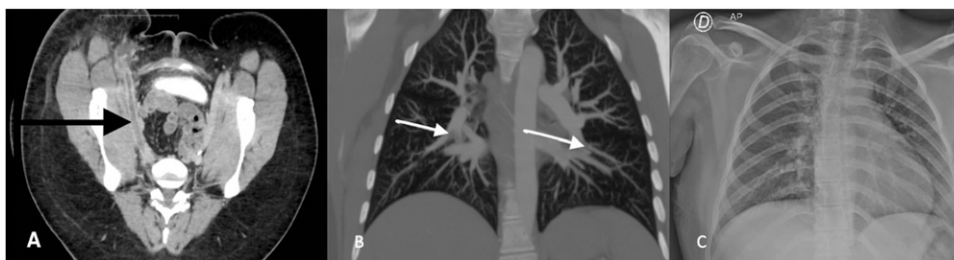
Foregoing, we described the case of a 22-year-old female, an otherwise healthy patient with pulmonary embolism (PE) and extensive deep vein thrombosis (DVT) as a unique clinical manifestation of COVID-19.

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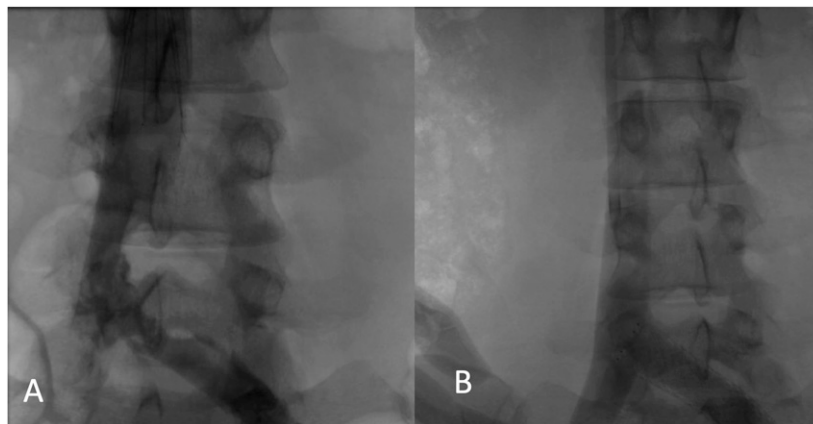
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**Figure 1.** CT scan. (a) Iliac venous thrombosis (red arrows). (b) Pulmonary embolism (red arrows). (c) Normal chest X-ray.



**Figure 2.** (a) Angiogram performed after open thrombectomy showing residual thrombus at the end of left iliac vein and inferior vena cava. (b) Angiogram at the time of vena cava filter retrieval showing complete iliac veins and vena cava patency.

## Case Description

Informed consent for this case report was obtained from the patient.

A 22-year-old healthy female was admitted with left leg edema and pain. She had no prior history of leg edema, chronic venous insufficiency, or DVT/PE. Hormonal contraceptives use was denied. Ultrasonography (US) showed DVT of popliteal, femoral, and iliac left veins, confirmed on venous CT. (Figure 1(a)). Chest CT scan showed bilateral PE of lobar and segment arteries and no signs of pneumonia (Figures 1(b) and (c)). Pulmonary Embolism Severity Index (PESI) scored 22 points (Class I).

RT-PCR for SARS-CoV-2 test was performed and it resulted positive with a medium viral load (Gen N 28.87, gen S 29.98, gen Orf 28.96).

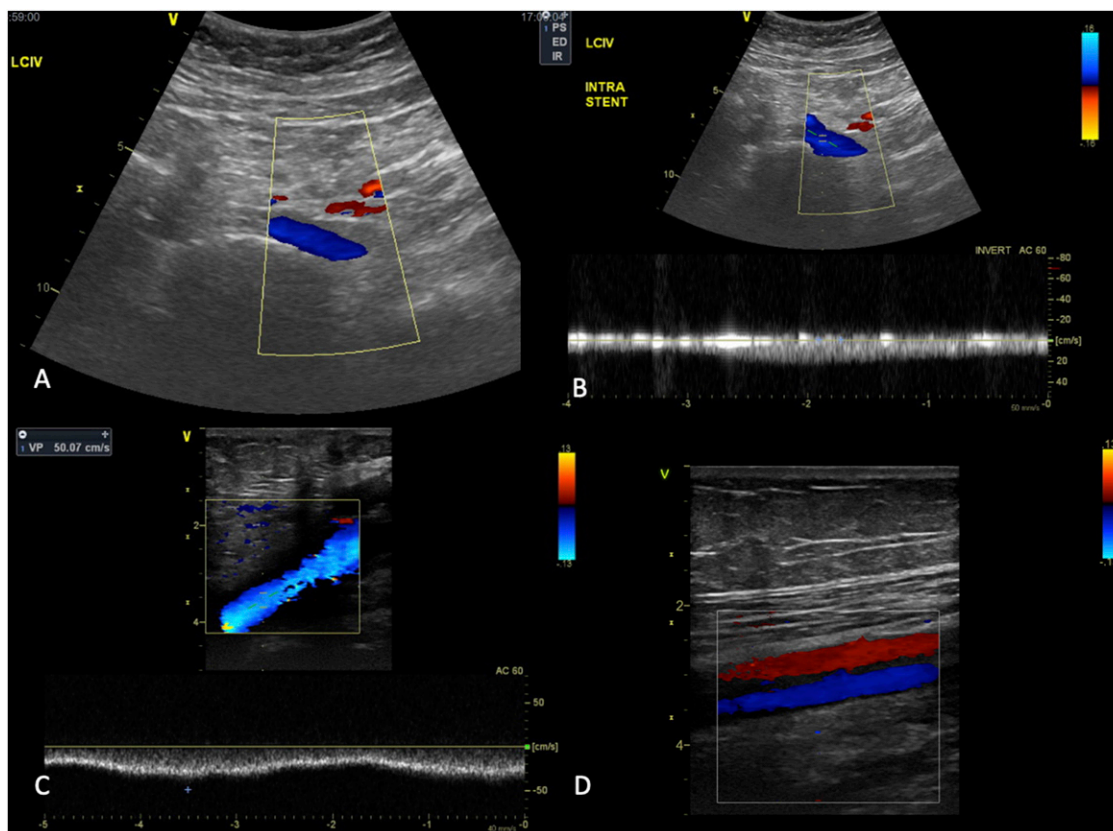
Laboratory tests were almost normal, except for an elevated D-dimer (2.3  $\mu\text{g/mL}$ —reference: 0–0.5) and elevated platelet count (618  $\text{K/uL}$ —reference: 150–450). All inflammatory marker (C-reactive protein, ferritin, and fibrinogen) levels were normal. Thrombophilia markers were all negative.

On that same admission, an independent vascular team treated the patient and placed a vena cava filter before performing open direct thrombectomy with Fogarty catheter.

Residual thrombus was left among iliac vein and vena cava. (Figure 2(a)). Two days later, the patient was discharged on rivaroxaban 15 mg bid. She was isolated for 10 days and did not develop any further COVID-19 symptoms.

Three weeks later, the patient's leg swelling and pain did not resolve, seeking a second opinion with our team. At that time, she was not able to walk because of pain and leg edema. Doppler US and CT scan confirmed complete thrombosis of the popliteal, femoral, and left iliac veins. No signs of external compression (May Thurner syndrome) could be identified. A new RT-PCR for SARS-CoV-2 test was performed with negative result.

Ultrasound-enhanced thrombolysis with EKOS (EndoWave Infusion Catheter System, EKOS Corporation, Bothell, WA) was performed for treatment of DVT, via a 6 Fr Sheath placed at distal left popliteal vein under US guidance. It was planned a total dose of 24 mg of tissue plasminogen activator (rt-PA) among 48 h. Fibrinogen serum levels dropped from 490 mg/dl to 112 mg/dl and rt-PA infusion was stopped after 40 h as spontaneous bleeding at the site of venous access was observed. Control venography showed residual proximal thrombus, and mechanical thrombectomy was performed with AngioJet Hemolytic Thrombectomy Device (AngioJet, Boston Scientific, Malborough, MA, USA). Although intravascular



**Figure 3.** Two weeks after procedure US Doppler. (a) Patent iliac stent. (b) Patent iliac stent. (c) Patent common femoral vein. (d) Patent common femoral vein.

ultrasound (IVUS) was not available, we performed different X-ray incidences and no external venous compression was seen, but a residual thrombus reduced the common iliac vein lumen in more than 90%. A nitinol self-expandable  $14 \times 120$  mm Zilver Vena Stent (Cook, Bloomington, IN, USA) was delivered covering the thrombus, with complete resolution of the residual stenosis. The next day, the patients left the hospital under full oral anticoagulation with rivaroxaban (Xarelto, Bayer Schering Pharma) and elastic compression was indicated.

Four weeks later, the vena cava filter was retrieved uneventfully, showing complete iliac veins and vena cava patency. (Figure 2(b)). A new chest CT scan revealed complete resolution of PE and no signs of pneumonia were seen. Leg edema disappeared, and US Doppler showed completely vein patency (Figure 3).

Full oral anticoagulation was sustained for 6 months.

## Discussion

COVID-19 pandemic is a catastrophic situation due to its highly contagiousness. According to the World Health Organization (WHO), transmission of SARS-CoV-2 can occur through direct, indirect, or close contact with infected

people through saliva and respiratory secretions or droplets, which are expelled when the infected person sneezes, coughs, or talks. The spectrum of symptomatic infection ranges from mild to critical with most of the cases being not severe. In patients with symptomatic disease, cough, myalgias, and headache are the most commonly reported symptoms. Other symptoms are diarrhea, sore throat, and smell or taste abnormalities.<sup>4,5</sup>

A retrospective study with 138 ICU COVID-19 patients associated DVT and PE with COVID-19 pneumonia. A total of 16.67% ( $n = 12$ ) of mostly critically ill patients in a high-risk category for thrombotic events were identified, of which 17% ( $n = 2$ ) were diagnosed with DVT. DVT was diagnosed by ultrasound in these patients, 3–18 days after hospital admission, while none of them had suggesting symptoms by the time they were admitted.<sup>6</sup>

New York City Health System reported 16% thrombotic events among hospitalized COVID-19 patients. VTE occurred in 7.1% of all hospitalized patients, being 4.2% of non-ICU patients and raised to 15.6% of ICU patients.<sup>7</sup>

A recent meta-analysis reported an overall incidence of VTE of 28.3% among 4382 hospitalized patients with COVID-19.<sup>8</sup> This incidence was 38.0% for severe cases and 17.2% for general cases. The total incidence of DVT of

lower extremities was 18.3%, being 22.1% and 12.8% in severe and general cases, respectively. The total incidence of PE was 17.6%, with a rate of 21.7% in severe cases and 12.5% in general cases. Furthermore, VTE was also related with higher mortality.

Asymptomatic DVT has been also reported in patients with COVID-19 pneumonia and elevated D-dimer, but to the best of our knowledge, there is no previous report of VTE in otherwise asymptomatic COVID-19 patients.<sup>9</sup>

A similar case was reported last year. Extensive DVT and PE was diagnosed in a patient who tested positive for RT-PCR for SARS-CoV-2 and had no sign of COVID-19 pneumonia; Nevertheless, he had presented mild symptoms of bronchitis a week before hospitalization, and his blood tests showed high inflammatory markers with elevated C-reactive protein, ferritin, and fibrinogen levels.<sup>10</sup>

It is remarkable that the patient we described above had no typical initial symptoms of COVID-19 and neither developed them later. Her blood test was normal, except for an elevated D-dimer. Besides, she was healthy and with no risk factors for a thromboembolic event. These findings might include VTE symptoms as a novel initial presentation of COVID-19, and RT-PCR for SARS-CoV-2 test should become mandatory in patients with otherwise unexpected TEV.

## Conclusion

COVID-19 appears to be a multi-symptomatic disease, and venous thromboembolism without any other previous described COVID-19 symptom could be considered one of its diverse clinical presentations and RT-PCR for SARS-CoV-2 tests emerge to be mandatory in patients with otherwise unexpected venous thrombosis.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## Informed Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy

of the written consent is available for review by the Editor-in-Chief of this journal on request.

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