Case Report

Left Ventricular Thrombus With COVID-19 Complication in a Patient With Dilated Cardiomyopathy

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ABSTRACT

Thrombosis, especially venous thromboembolism, is a complication often associated with coronavirus disease 2019 (COVID-19). However, there have been relatively few reports of arterial thrombosis. Here, we describe a case of non-severe COVID-19 in a patient with dilated cardiomyopathy. After admission, symptoms, laboratory data, and imaging findings improved, but D-dimer levels gradually increased. Contrast computed tomography and echocardiography revealed a left ventricular thrombus. Anticoagulant treatment diminished the thrombus, and the patient recovered and was discharged. Although a left ventricular thrombus is a rare COVID-19 complication, performing appropriate diagnostic tests could improve COVID-19 mortality in patients with dilated cardiomyopathy.

RÉSUMÉ

La thrombose, en particulier la maladie thromboembolique veineuse, est une complication souvent associée à la maladie à coronavirus 2019 (COVID-19). Cependant, il y a eu relativement peu de cas rapportés de thrombose artérielle. Nous décrivons ici un cas non grave de COVID-19 chez un patient atteint de cardiomyopathie dilatée. Après admission, des améliorations ont été constatées concernant les symptômes, les résultats des tests de laboratoire et les résultats d'imagerie, mais les taux de D-dimères ont progressivement augmenté. La tomodensitométrie avec produit de contraste et l'échocardiographie ont révélé un thrombus ventriculaire gauche. Un traitement anticoagulant a réduit le thrombus, et le patient s'est remis et a reçu son congé. Bien qu'un thrombus ventriculaire gauche soit une complication rare de la COVID-19, la réalisation de tests diagnostiques appropriés pourrait diminuer la mortalité due à la COVID-19 chez les patients atteints de cardiomyopathie dilatée.

In December 2019, an outbreak of a new type of coronavirus—severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)—was reported. This new disease was named coronavirus disease 2019 (COVID-19) by the World Health Organization. According to previous reports, patients with COVID-19 are at high risk of thrombosis, especially venous thromboembolism.¹ Herein, we describe a patient with dilated cardiomyopathy (DCM) diagnosed with COVID-19 who presented with left ventricular thrombi (LVT).

Case Presentation

A 56-year-old man with DCM had cough, fatigue, palpitations, shortness of breath, and fever 4 days before admission. After a positive polymerase chain reaction result for SARS-CoV-2 at a local hospital, he was referred to our hospital. He had regular echocardiography, and his previous echocardiography in August 2018 showed diffuse left ventricular hypokinesis with an ejection fraction of 30%, a left ventricular end-diastolic diameter (LVDd) of 64 mm, a left ventricular end-systolic diameter (LVDs) of 53 mm, and no LVT.

Upon admission, body temperature was 37.9 °C, heart rate was 130 beats per minute, blood pressure was 107/81 mm Hg, respiratory rate was 22 times per minute, and oxygen saturation was 96% on ambient air. Blood tests showed a white blood cell count of 6300 /μL (69.0% neutrophils and 16.0% lymphocytes), C-reactive protein level of 22.91 mg/L, B-type natriuretic peptide level of 683.4 pg/mL, D-dimer level of 3.0 μg/mL, troponin T level of 0.028 ng/mL, creatine kinase level of 95 U/L, and creatine kinase-MB level of 0.7 U/L. The electrocardiography showed sinus tachycardia with incomplete right bundle branch block and left posterior

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See page 126 for disclosure information.

Novel Teaching Points

- COVID-19 causes not only venous thrombosis but also arterial thrombosis.
- Left ventricular thrombus is a complication of COVID-19 in patients with dilated cardiomyopathy.
- Echocardiography should be considered for patients with chronic heart disease who develop COVID-19.

hemiblock (Supplemental Fig. S1). Chest radiography and a computed tomography scan showed bilateral interstitial infiltrating shadows, a dilated cardiothoracic ratio, pulmonary edema, and pleural effusion (Supplemental Fig. S2). Based on these findings, our diagnosis was COVID-19 complicated with heart failure. We administered an antiviral (Favipiravir) as well as intravenous diuretics. Given that venous thromboembolism risk was considered low (Padua prediction score: 2), no thromboprophylaxis treatment was administered.

Three days after admission, his temperature returned to normal, along with laboratory data (C-reactive protein 1.86 mg/L). His respiratory status and blood pressure were stable. However, the D-dimer level increased to 8.9 $\mu\text{g/mL}$. Therefore, we performed a contrast computed tomography scan to investigate thrombosis, and we found the presence of LVT (Fig. 1A-D, red arrow), but no deep vein thrombosis of the

abdomen and lower extremities. A bedside transthoracic echocardiography revealed a hyperintense, non-floating mass (1.7×1.5 cm) at the left ventricular apex, consistent with LVT (Fig. 2A, red arrow).

We started anticoagulation therapy with intravenous unfractionated heparin and switched to a vitamin-K antagonist 4 days later. A bedside transthoracic echocardiogram 8 days after therapy did not reveal a clear thrombus (Fig. 2B). The patient was discharged after 32 days of hospitalization and will be on anticoagulants at least for 6 months.

Discussion

COVID-19 may predispose a patient to venous and arterial thromboembolic disease due to excessive inflammation, hypoxia, immobilization, and diffuse intravascular coagulation.² The coagulation activation mechanism during SARS-CoV-2 infection is currently unclear, but it might be correlated to the increased inflammatory response rather than to the virus itself.³ An observational study reported that anticoagulation may be associated with improved outcomes in patients hospitalized with COVID-19.⁴ However, current guidelines do not support the use of anticoagulation prophylaxis for nonsevere COVID-19. Our patient had a low cardiac systolic function DCM, suggesting a high risk of LVT. He was never diagnosed with LVT prior to admission and most likely developed LVT due to a coagulopathy caused by COVID-19. Further studies regarding anticoagulant prophylaxis for

Figure 1. Contrast computed tomography (CT) scan and transthoracic echocardiography findings 3 days after admission. (A) Chest CT showing bilateral infiltrating shadows improvement. (B) Non-enhanced mass in the left ventricle (red arrow). (C, D) 3-D CT imaging with suspected left ventricular thrombosis (blue).

Figure 2. Transthoracic echocardiography findings. (A) Echocardiography 3 days after admission showed a hyperintense, non-floating mass (1.7×1.5 cm) at the left ventricular apex, which is compatible with LVT (red arrow). (B) Follow-up echocardiography showing no clear thrombus.

COVID-19 patients with chronic heart diseases, including DCM, are warranted.

According to an American Society of Echocardiography statement, the performance of echocardiography puts the provider at high risk of COVID-19 infection, because the SARS-CoV-2 virus is very easily spread.⁵ We should collectively be aware of LVT complications in COVID-19 patients with DCM, even with nonsevere COVID-19. Therefore, more aggressive echocardiography should be considered for patients with chronic heart disease who are infected with SARS-CoV-2.

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Disclosures

The authors have no conflicts of interest to disclose.

References

1. Wang T, Chen R, Liu C, et al. Attention should be paid to venous thromboembolism prophylaxis in the management of COVID-19. *Lancet Haematol* 2020;7:e362-3.
2. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet* 2020;395:1054-62.
3. Connors JM, Levy JH. COVID-19 and its implications for thrombosis and anticoagulation. *Blood* 2020;135:2033-40.
4. Paranjpe I, Fuster V, Lala A, et al. Association of treatment dose anticoagulation with in-hospital survival among hospitalized patients with COVID-19. *J Am Coll Cardiol* 2020;76:122-4.
5. Kirkpatrick JN, Mitchell C, Taub C, et al. ASE Statement on Protection of Patients and Echocardiography Service Providers During the 2019 Novel Coronavirus Outbreak: Endorsed by the American College of Cardiology. *J Am Soc Echocardiogr* 2020;33:648-53.

Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at <https://www.cjopen.ca/> and at <https://doi.org/10.1016/j.cjco.2020.09.014>.