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Case Report

Vascular Thromboembolism is a Grave Complication of COVID-19

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ABSTRACT

There is ample evidence that the coronavirus can cause fatal blood clots. Angiotensin-converting enzyme 2 (ACE2) receptors act as a gateway for the coronavirus to enter the body and facilitate infection. ACE2 receptors are scientifically linked to disease severity in smokers because nicotine is thought to affect ACE2 expression in different ways.

Patients admitted with severe COVID-19 infection with high levels of factor V Leiden are prone to serious damage from blood clots such as deep vein thrombosis or pulmonary embolism.

Damage to the vascular endothelium is a complication that can be caused by the coronavirus. It can cause vascular clots, in the formation of which factors such as age, sex, blood type, and underlying diseases are effective. Thrombotic events, especially venous thrombosis, following COVID-19 infection have already been described; nonetheless, data are scarce on arterial thrombosis.

Herein we report 4 cases of COVID-19 infection complicated by arterial thrombosis. ***(Iranian Heart Journal 2022; 23(1): 223-227)***

KEYWORDS: COVID-19, Arterial thrombosis, Echocardiography

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COVID-19, as a pandemic disaster, involves multiple organs, with cardiovascular manifestations in many patients. [1]

As COVID-19 infection is an unknown disease, cardiovascular surgery in urgent patients with this infection is a difficult decision to make. [2]

We present a case series of 4 COVID-19 patients who underwent urgent cardiac surgery. [3] Our center is a referral center for cardiovascular surgery in Iran.

CASE I

A 62-year-old man presented to the emergency department with fever and cough. His past medical history included hypertension and smoking.

Physical examination revealed a body temperature of 37.5 ℃, a blood pressure of 130/85 mm Hg, a heart rate of 79 bpm, a respiratory rate of 17 breaths per minute, and an oxygen saturation level of 90% on room air.

A nasopharyngeal swab test for reverse transcriptase-polymerase chain (RT-PCR) assay for COVID-19 infection was positive.
Laboratory test results revealed an erythrocyte sedimentation rate of 60 (the normal range =up to 30), a C-reactive protein level of 2+, a white blood cell count of 12300, blood group A+, and a D-dimer level of 203 (the normal range =up to 500).
Chest computed tomography showed patchy ground-glass opacities in bilateral lung fields. The following day, progressive typical chest pain was added to the patient's symptoms. Cardiac angiography showed left main and triple-vessel coronary artery involvement.
The patient underwent urgent coronary artery bypass graft (CABG) surgery. The total bypass time was 112 minutes, and the cross-clamp time was 60 minutes. The grafts were the left internal mammary artery on the left anterior descending coronary artery and saphenous vein grafts on the obtuse marginal and the right coronary artery. At the end of the surgery, the patient was separated from the cardiopulmonary bypass with a high-dose inotrope. Consequently, a balloon pump was used until the need for an inotrope was low, and it was placed in the right femoral artery. After the operation, the patient was transferred to the intensive care unit (ICU) with a low-dose inotrope while being on an intra-aortic balloon pump.
The patient was extubated and weaned from the ventilator without any difficulty on the first postoperative day. On day 3, he began complaining of right lower extremity pain. Physical examination demonstrated right lower limb pulselessness and coldness. Additionally, bedside Doppler sonography showed no flow in the femoral and popliteal arteries. An arteriotomy and an embolectomy were performed, and an occlusive thrombus was noted within the vessel (Fig. 1).
Postoperatively, the patient's pulse and coldness worsened, necessitating Doppler sonography. Doppler imaging revealed thrombi in the iliac artery and the right femoral artery. He was started on a continuous therapeutic infusion of unfractionated heparin. Over the next 2 days, his shock worsened, and he developed anuria and metabolic acidosis. Unfortunately, he expired despite supportive treatment.

Figure 1. The image shows a thrombus, which was removed from within the vessel.

CASE II

A 59-year-old man presented to the emergency department following a respiratory distress episode. The patient's past medical history included femoral fracture and femoral surgery due to a fall. He was receiving Zalerban.
Physical examination revealed a body temperature of 37.5 ℃, a blood pressure of 125/60 mm Hg, a heart rate of 95 bpm, a respiratory rate of 22 breaths per minute, and an oxygen saturation level of 88% on room air.
Significant laboratory findings included a white blood cell count of 10700 cells/uL, an erythrocyte sedimentation rate of 50 (the normal range =up to 30), a C-reactive protein level of 2+, and a D-dimer level of 6761 ng/mL. A PCR test confirmed infection with COVID-19.
Echocardiography revealed a 4×5 cm thrombus in the right ventricle. In computed

tomography angiography, a clot was seen in the right pulmonary artery.
The patient underwent an urgent pulmonary embolectomy and right ventricular mass resection surgery because of progressive hypoxia (Fig. 2).
Treatment with low molecular weight heparin was commenced, and the patient was admitted to the ICU. On hospital day 2, he was extubated in the ICU, and his oxygen saturation level rose to 95%.

Figure 2. The image illustrates a right ventricular mass, which was removed in an urgent pulmonary embolectomy.

CASE III

A 67-year-old woman presented to the emergency department with severe shortness of breath of 7 days' duration. The patient's past medical history included hypertension and hyperlipidemia. She had no recognized predisposing factors for venous thromboembolism. Laboratory test results revealed a white blood cell count of 10200 cell/uL, an erythrocyte sedimentation rate of 59 (the normal range =up to 30), a C-reactive protein level of 1+, a D-dimer level of 560 ng/mL, and blood type B−.
A PCR test confirmed infection with COVID-19. On physical examination, the patient had tachypnea, tachycardia, and an oxygen saturation level of 80% on room air.
Lower limb physical examination revealed pulselessness, progressive mottling, and gangrene in the left lower limb (Fig. 3). Unfortunately, she expired because of septic shock and progressive limb gangrene despite supportive management.

Figure 3. The image depicts gangrene in the patient's left lower limb.

CASE IV

A 66-year-old man presented to the emergency department with a sudden onset of chest pain preceded by a 2-day history of fever.
The patient's past medical history included diabetes, hypertension, and smoking. Laboratory test results revealed a white blood cell count of 8100 cells/uL, an erythrocyte sedimentation rate of 40 (the normal range =up to 30), and a C-reactive protein level of 2+.
A PCR test confirmed infection with COVID-19. Due to the patient's progressive typical chest pain, an urgent cardiac angiography was performed. Angiography showed an 8×5 thrombus in the right coronary artery and triple-vessel coronary artery involvement. He underwent an urgent CABG and thrombosis resection.
After the operation, the patient was transferred to the ICU, where he was

extubated and weaned from the cardiopulmonary bypass without difficulty. He was discharged from the hospital on the fifth day.

DISCUSSION

COVID-19, as an unknown disease, has various clinical manifestations; consequently, cardiovascular surgery in patients with this infection is a difficult decision to make. [2]

Our 4 cases explain some of the difficulties in decision-making about these patients.

Arterial thrombosis is a rare complication in patients hospitalized with COVID-19.

Our CASE I and CASE IV initially presented with cardiac-related symptoms and signs and developed atypical forms of COVID-19 pneumonitis. Cardiac angiographic imaging revealed left main and triple-vessel coronary artery involvement; therefore, an urgent CABG was performed. Concerning CASE I, on the third postoperative day, occlusive thrombosis occurred in the right femoral and popliteal arteries and both iliac arteries.

Arterial thrombosis involves approximately 4% of severely ill COVID-19 patients. [3] Cheruiyot et al [3] concluded that arterial thrombosis presented symptomatically and could involve multiple arteries in patients with severe COVID-19. The anatomical distribution of arterial thrombotic accidents was wide, occurring in limb arteries (39%), cerebral arteries (24%), the great vessels (the aorta, the common iliac, and the common brachiocephalic trunk [19%]), the coronary artery (9%), and the superior mesenteric artery (8%). The authors also reported that the mortality rate in these patients was 20%.

CASE II represents another example of an acute thrombotic event in the pulmonary artery and the right ventricle. The patient underwent an urgent pulmonary embolectomy and right ventricular mass resection. [7]

CASE III serves as an instance of a progressive massive thrombus in the left femoral artery and severe gangrene in the leg.

The prescription of anticoagulants in patients with COVID-19 nominated for surgery could be useful. In addition, D-dimer checking is significant in predicting the thrombosis risk in patients with COVID-19.

Blood type in 3 cases was A+ and in 1 patient B−. Further research is needed to clarify the relationship between COVID-19 and the ABO blood type. [6]

CONCLUSIONS

We herein reported 4 cases of arterial thrombosis in patients with COVID-19. Our cases show that healthcare providers should be aware of the life-threatening presentations of COVID-19.

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