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Acute Thrombosis of an Aortic Prosthetic Graft in a Patient with Severe COVID-19–Related Pneumonia

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Background: COVID-19 infection has been reported to be related with an increased risk of thrombotic complications because of the hypercoagulability state and inflammation. At the moment, no reports are available regarding thrombosis of prosthetic vascular grafts. We present the case of a patient with COVID-19–related pneumonia, who suffered from the acute thrombosis of a previously implanted aortic graft.

Methods and results: A 67-year-old male patient, who had undergone open repair of an abdominal aortic aneurysm with a bifurcated graft 6 years before, was admitted to the emergency department with high fever for a week without cough or dyspnea. Thoracic ultrasound showed signs of bilateral interstitial pneumonia, and the Sars-Cov-2 swab was positive. Antiretroviral therapy and prophylactic low molecular weight heparin treatment were initiated. Owing to the progressive impairment of the respiratory function, the patient was intubated after eight days from the admission, the day after he showed signs of bilateral acute limb ischemia. A duplex ultrasound demonstrated the complete thrombosis of the aortic graft without flow at the femoral level. An urgent angio-computed tomography scan for revascularization purpose was requested, but the patient died on the arrival in the radiological suite.

Conclusions: Acute thrombosis of vascular prosthetic grafts is a possible, catastrophic complication of COVID-19 infection. In COVID-19 patients with prosthetic graft, an aggressive antithrombotic treatment could be considered to prevent such an event.

INTRODUCTION

There is increasing number of reports on thrombotic complications in patients with COVID-19 infection.^{1–3}

In particular, arterial thrombosis account for about 4% of thromboembolic complications during COVID-19, but at the moment, there are no reported cases of prosthetic graft occlusion. In the present article, we describe the case of a patient with COVID-19–related pneumonia, who suffered from acute thrombosis of a previously implanted aortic graft. At the moment of hospital admission, the patient gave his consent to

the treatment of personal data, including the possibility to use them for scientific purposes.

CASE PRESENTATION

A 67-year-old male entered the emergency room on March 23rd, 2020, with high fever (100.4°F) for a week, but no cough or dyspnea. The patient suffered for years of arterial hypertension in treatment with ace inhibitor and calcium channel blocker, and in 2014, he had undergone open repair of a 60 mm abdominal aortic aneurysm with a 14/7 mm bifurcated aorto-bi-iliac Dacron graft. Since then,

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he was in treatment with 100 mg/die of acetylsalicylic acid. In January 2019, a duplex ultrasound (DUS) examination had demonstrated the patency of the graft, the absence of pseudoaneurysms or stenosis, and a normal flow of the femoral-popliteal-tibial axis in both legs. At the admission, the abdomen was treatable and femoral and peripheral pulses were present normally at both legs. Oxygen saturation (SaO₂) was 89% in air, arterial blood gas (ABG) in air showed pH 7.47, PaCO₂ 29, PaO₂ 57, Hb 15, SaO₂ 89.7, and HCO₃⁻ 22. The thoracic ultrasound demonstrated moderate bilateral B-lines without pleural effusion. At the thoracic radiography, interstitial thickenings in the medium and basal right field with prevalent mantled distribution were shown. The Sars-Cov-2 swab executed a positive result.

An antiviral therapy with lopinavir/ritonavir and hydroxychloroquine was administrated. Moreover, thrombotic prophylaxis with subcutaneous enoxaparin (50 IU/kg per day) was initiated. In the following days, the ABG values got worse, with a drop of Horowitz index (HI) under 100 despite the ventilation with reservoir. On March 25th, due to the worsening of respiratory exchanges, the patient was transferred to the intensive care unit. At that moment, he had fever and dyspnea. Blood tests showed fibrinogen 432 mg/dL, D-dimer 754 ng/mL, interleukin 6 (IL-6) 19.6 pg/mL, and PCR 107 mg/L. Continuous positive airway pressure (CPAP) ventilation was initiated (positive end-expiratory pressure (PEEP)-8-FiO₂ 80%), therapy with lopinavir/ritonavir and hydroxychloroquine was continued, and the patient also started, in the absence of contraindications, the therapeutic protocol currently used in our hospital with methylprednisolone 80 mg and tocilizumab (2 doses). Respiratory exchanges got worse (HI: 64) and the patient was intubated and pronated immediately. On March 31st, the patient suddenly showed pallor and hypothermia of both legs, with mottled skin starting from the transverse umbilical line. Femoral and peripheral pulses were absent in both legs. Blood tests showed D-dimer 104822 ng/mL, creatine phosphokinase 1124 U/L, myoglobin 33,327 ng/mL, lactate dehydrogenase 1124 U/L, and IL-6 >200 pg/mL. Continuous intravenous administration of sodium heparin at anticoagulant dosage (1000 IU/h) was immediately started. A bedside DUS showed the patency of the suprarenal aorta and of the renal arteries and the complete thrombosis of the aortic graft without detectable blood flow at the femoral level. An angio-computed tomography scan was immediately requested for an intended attempt of hybrid revascularization with bilateral femoral surgical access and thrombectomy under fluoroscopic guide. However, on the arrival in the radiological suite, the patient presented severe hypotension not respondent to the infusion of amine at high dosage, bradycardia, and later, pulseless electrical activity. Despite cardiopulmonary resuscitation, the patient presented flatline, and the death was declared.

DISCUSSION

Sars-Cov-2 infection is associated with an increased risk of thromboembolic complications because of

inflammation, stasis, and hypercoagulable status.^{4,5} Most of the reported cases deal with venous thromboembolism, whereas few arterial thromboses are reported.^{1,6} Moreover, at the moment, no cases regarding thrombosis of prosthesis and vascular stents are reported. We reported the case of acute thrombosis of a prosthetic aortic graft in a patient with severe COVID-19-related infection. Aortic graft thrombosis is an uncommon event, accounting for less than 1% of all aortic reconstructions, and it is favored by concurrent conditions as proximal and distal anastomosis stenosis or severe occlusive disease of the outflow vessels.⁷ In the present case, the patient did not show any signs of distal hypoperfusion at the admission, and the most recent outpatient examination had demonstrated normal patency of the graft without proximal or distal significant disease. As a consequence, the only possible explanation for such an event was hypercoagulability and inflammation, as supported by the laboratory tests, showing very high levels of D-Dimer and IL-6. This finding can explain why thrombosis did not occur immediately at hospitalization but after a few days, in the moment when the inflammatory response in the patient was hyperactivated, as reported in the late stages of the infection.⁸ The patient was on heparin therapy at the prophylactic dose of 50 IU/kg, which has not been enough to prevent the acute thrombotic event.⁹ It is reasonable to think that, if a patient with Sars-Cov-2 infection has a higher thrombotic risk, this will be much higher in a patient with a vascular prosthesis. For this reason, it can be suggested that patients with vascular prosthesis could be considered a selected subgroup, in which, in case of COVID-19, it is probably necessary to start an aggressive treatment with heparin at therapeutic dosage. Acute aortic thrombosis is a condition associated with high mortality. Even in our case, the patient, who already showed very bad general condition because of the COVID-19, died. If the general conditions would have allowed it, the planning would have been a hybrid revascularization attempt, with bilateral surgical access and thrombectomy under fluoroscopic guide. In our opinion, it would have been the best treatment for this condition.

CONCLUSIONS

Acute thrombosis of vascular prosthetic grafts is a possible, catastrophic complication of COVID-19 infection. In COVID-19 patients with a prosthetic graft, an aggressive antithrombotic treatment could be considered to prevent such an event.

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