Case Report

Free floating aorto-iliac thrombosis: A rare complication of COVID-19 pneumonia

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Article history:
Received 20 August 2022
Revised 17 October 2022
Accepted 23 October 2022

Keywords:
covid19
Aorta
Thrombosis
Ischemia

Abstract

Arterial thrombosis encountered during sars-cov2 infections is a rare complication with a poor prognosis compared to venous ones. They generally occur in severe and critical clinical forms of covid19 [1,2].

The physiopathology of arterial thrombosis, even if not completely understood highlights hypercoagulability and excessive inflammation as risk factors with a major role of the endothelial lesions in their occurrence. The presence of cardiovascular risk factors in patients infected with covid19 is also discussed as a predisposing factor for arterial thrombosis [2,3].

We report the case of a North African male patient hospitalized for acute respiratory distress syndrome (ARDS) secondary to covid19 pneumonia, complicated by the occurrence of multiple arterial thrombosis of the aorto-iliac axis with the rare finding of two free floating thrombus in the aorta and the right common iliac artery. Clinically, the patient had developed acute bilateral lower limb ischemia and multi-organ failure and the evolution was dramatic with rapid worsening of the patient’s health and eventually his death.

Thromboembolic complications are frequent during covid19 infection but the aortic localization is very rare. Its diagnosis is difficult and it has a poor prognosis. Our objective through this case report is to increase knowledge about arterial thromboembolic events while discussing their link to the sars-cov2 viral infection.

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Introduction

Since the emergence of the SARS-CoV-2 virus pandemic, several studies have demonstrated a link between this viral infection and a hypercoagulability state that seems to be implicated in the appearance of thromboembolic events. Arterial thrombosis is rare but is related to a higher rate of morbidity and mortality in critically ill patients.

This work describes the occurrence of multiple thrombosis of the aorto-iliac axis with the unexpected finding of a free floating thrombus in both the abdominal aorta and the right common iliac artery, in a subject hospitalized for acute respiratory distress syndrome secondary to COVID-19 pneumonia. Clinically, it was revealed by bilateral lower limb ischemia and multiple organ failure. Our aim is to increase knowledge about atypical arterial thromboembolic complications of the viral SARS-CoV-2 infection.

Case presentation

We present the case of a 61-year-old male North African patient, diabetic on oral metformin for the past 20 years with no other medical history, in particular, no hypertension, no dyslipidemia, no chronic smoking and he was not vaccinated against COVID-19. He was hospitalized for a moderate clinical form of COVID-19 for 9 days in the medical ward during the second wave of COVID-19 when delta was the most prevalent variant, then he was transferred to the intensive care unit 48 hours after he developed acute respiratory distress associated with diabetic ketoacidosis.

The clinical examination on admission found a conscious patient with Glasgow score at 15/15, SpO2 at 87% in ambient air and at 97% under 15 L of O2 delivered by a high concentration oxygen mask, heart rate was at 99 BPM, blood pressure was at 141/70 mmHg, capillary blood sugar at 3 g/l with 3+ acetone on urinary dipsticks, and there were no signs of respiratory struggle. No abnormalities were found in the abdominal examination, and there were no signs of deep venous thrombosis nor clinical signs of acute ischemia of the lower limbs. The diagnosis of COVID-19 was confirmed by a positive PCR test and a thoracic CT scan performed on day 1 of hospitalization. The emergency CT angiography showed multiple free floating thrombi of the abdominal aorta and the right common iliac artery, with total and bilateral occlusions of the right and left leg arteries at different levels with an embolic appearance (Figs. 1–5).

A vascular surgeon’s opinion was sought on both the floating thrombus and the lower limb ischemia, no surgical plan was put in place for the aortic thrombosis but the indication of bilateral amputation of the lower limbs was set.

The patient was under Enoxaparin (low molecular weight heparin) 6000 UI twice a day, 14 days before the onset of the lower limb ischemia. The dosage was increased to 8000 UI twice a day, on the eleventh day of hospitalization in the intensive care unit. He was also put on Aspirin 160 mg 5 days before the thrombotic event.

The evolution was marked by the rapid worsening of the hemodynamic and respiratory state with intubation of the patient and necessity of usage of norepinephrine. The patient died on day 13 of hospitalization from multiorgan failure.

Discussion

Several authors have demonstrated the link between SARS-CoV-2 infection and thromboembolic events, particularly in critically ill patients hospitalized at the intensive care unit. Even with adequate anti-thrombotic prophylaxis, these complications remain very frequent. Aortic thrombosis is extremely rare compared to venous thrombosis, and is correlated with a higher risk of mortality [1]

The physiopathology is not completely clear but it’s certainly multifactorial, involving essentially a dysregulation of the inflammatory response. The presence of cardiovascular risk factors or endothelial lesions predisposes to the occurrence of arterial thromboembolic events. These lesions are aggravated by the binding of the virus to the ACE-2 receptor expressed in the vessels, where there subsequently will be more localized inflammation and endothelial lesions eventually leading to the formation of thrombosis [2,3].

One study found that arterial thromboembolic events occur in 5.6% of patients admitted for COVID-19, 11 days after the first symptoms of infection on average, with the aorta being an atypical location (2 aortic locations out of 30 arterial thrombosis) [4].

A meta-analysis of 27 articles found that arterial thrombosis occurs in 4.4% of severe and critical forms of COVID-19 pneumonia. The median age of patients with arterial thrombosis is over 60 with a clear male predominance. The majority of patients had comorbidities, mainly diabetes, cardiovascular disease, renal disease and neoplasia [5]. Our patient is a 61-year-old male subject who has several cardiovascular risk factors.

In multivariate analysis, only the D-dimer level, measured early after admission, was associated with the risk of arterial thrombosis. The Kaplan-Meier analysis showed that a D-
Fig. 1 – Visualization of the free floating thrombus in both the infrarenal abdominal aorta and right common iliac artery, frontal section.

Fig. 2 – Visualization of the floating thrombus in the right common iliac artery in a transversal section.
Fig. 3 – Visualization of the floating thrombus of the infrarenal abdominal aorta in a transversal section.

Fig. 4 – Occlusion of the left posterior tibial artery.
dimer level > 1250 ng/mL multiplied by 6 the risk of occurrence of arterial thrombosis [4]. The D-dimer level in our patient was >4000 ng/mL, which is consistent with the values proposed by these studies.

The radiological diagnosis is usually made with CT angiography, a free floating thrombus is rarely observed and it’s mostly diagnosed after an embolic event, similarly to our patient’s case where the diagnosis was made only after the embolic event leading to the bilateral lower limb ischemia.

Therapeutic management is discussed on a case-by-case basis but the prognosis remains very reserved with an estimated 20%-50% mortality rate [3,5]. Many suggest endovascular or open surgery as treatment while others suggest thrombolytic treatment but there are no specific recommendations [6–8]. For our patient, no surgical treatment was suggested for the floating thrombus but amputation was indicated for the lower limbs. Many studies have shown the interest of systematically using low molecular weight heparin as a preventative anticoagulation treatment in critically ill COVID-19 patients, in order to lower the risk of thromboembolic events [9]. In our case, the patient was on antithrombotic treatment at a curative dose: LMWH 6000 UI twice a day, 14 days before the onset of thromboembolic event but it did not improve his prognosis.

**Conclusion**

Thromboembolic complications are frequent during COVID-19 infection but the aortic localization is rare. Diagnosing a free floating thrombus is difficult and its treatment remains unclear. A high D-dimer level on admission could identify patients at risk of arterial thrombosis, particularly arterial ones.

**Patient consent**

I confirm in my own words that there is no legal conflict, the consent was obtained and declare that the family was informed of all the written information related to the patient’s medical case, and accept it to be published.

**REFERENCES**

[1] Al-Ani F, Chehade S, Lazo-Langner A. Thrombosis risk associated with COVID-19 infection. A scoping review. Thromb Res 2020;192:152–60. doi:10.1016/j.thromres.2020.05.039.
[2] Pons S, Fodil S, Azoulay E, Zafrani L. The vascular endothelium: the cornerstone of organ dysfunction in severe SARS-CoV-2 infection. Crit Care 2020;24(1):353. doi:10.1186/s13054-020-03062-7.

[3] Woehl B, Lawson B, Jambert L, Tousch J, Ghassani A, Hamade A. 4 cases of aortic thrombosis in patients with COVID-19. JACC Case Rep 2020;2(9):1397–401. doi:10.1016/j.jaccas.2020.06.003.

[4] Fournier M, Dossier A, Mageau A, Berleur M, Delaval L, Goulenok T, et al. Thromboses artérielles et infection COVID-19. Rev Méd Interne 2020;41:A10. doi:10.1016/j.revmed.2020.10.023.

[5] Cheruiyot I, Kipkorir V, Ngure B, Misiani M, Munguti J, Oging’o J. Arterial thrombosis in coronavirus disease 2019 patients: a rapid systematic review. Ann Vasc Surg 2021;70:273–81. doi:10.1016/j.avsg.2020.08.087.

[6] Avelino MC, de Miranda CLVM, de Sousa CSM, Bastos BB, de Sousa RSM. Free-floating thrombus in the aortic arch. Radiol Bras 2017;50(6):406–7. doi:10.1590/0100-3984.2016.0083.

[7] Takagi H, Mori Y, Umeda Y, Fukumoto Y, Matsuno Y, Mizuno Y, et al. Surgical treatment of thoracoabdominal aortic mural and floating thrombi extending to infrarenal aorta. J Vasc Surg 2003;37(6):1324–7. doi:10.1016/S0741-5214(02)75466-9.

[8] Bozzani A, Arici V, Tavazzi G, Franciscone M, Danesino V, Rota M, et al. Acute arterial and deep venous thromboembolism in COVID-19 patients: risk factors and personalized therapy. Surgery 2020;168(6):987–92. doi:10.1016/j.surg.2020.09.009.

[9] Miesbach W, Makris M. COVID-19: coagulopathie, risque de thrombose et justification de l’anticoagulation. Clin Appl Thromb 2020;26:1076029620938149. doi:10.1177/1076029620938149.