

# Acute Aortic Syndrome in a patient with COVID-19

João Campos Cunha<sup>1,\*</sup>, António José Cruz<sup>1,2</sup>, Beatriz Madureira<sup>1</sup>, Yolanda Martins<sup>1</sup>, Gonçalo Sarmento<sup>1</sup>

<sup>1</sup> Entre o Douro e Vouga Hospital Center, Santa Maria da Feira, Portugal. <sup>2</sup> Infectious Diseases Department, São João Hospital and University Center, Porto, Portugal.

\*Correspondence: João Campos Cunha, Entre o Douro e Vouga Hospital Center, R. Dr. Cândido Pinho 5, 4520-211 Santa Maria da Feira, Portugal. Email: joao.c.cunha@chedv.min-saude.pt

How to cite this article: Cunha JC, Cruz AJ, Madureira B, et al. Acute Aortic Syndrome in a patient with COVID-19. Arch Clin Cases. 2023; 10(1):47-49. doi: 10.22551/2023.38.1001.10239

## ABSTRACT

The global effects of the COVID-19 pandemic make it of the utmost importance to comprehend its mechanisms and define strategies for the most effective approach possible. The SARS-CoV-2 virus can be responsible for the induction of a hypercoagulable state, which can trigger vascular phenomena of venous etiology, specifically deep venous thrombosis or pulmonary embolism. Arterial thrombotic events associated with COVID-19 have also been described in the medical literature, although less frequently. In this paper the authors report the case of a 66-year-old man who was diagnosed with an Acute Aortic Syndrome, specifically an intramural thrombus on the aortic arch, while he was still infected with the virus. Anticoagulation with low weight molecular heparin was initiated and the patient was admitted at the Internal Medicine ward for a conservative therapeutic approach. The thrombus remained stable on a serial imaging evaluation; therefore, the patient was discharged with oral anticoagulation with subsequent follow-up in the outpatient clinic. This case describes a rare and potentially serious complication of COVID-19, which highlights how broad its clinical spectrum can be, affecting systems other than the pulmonary.

**KEYWORDS:** SARS-CoV-2; Acute aortic syndrome; COVID-19; Anticoagulation

## INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is an infection caused by the SARS-CoV-2 virus, whose symptoms are mostly respiratory. However, as its study progresses, new severe clinical findings are being discovered, showing that it can affect several systems of the organism other than the pulmonary.

Acute aortic syndrome (AAS) includes a group of acute pathologies with possible life-threatening risk that affect the thoracic segment of the aortic artery [1]. These conditions include aortic dissection, intramural thrombus or penetrating aortic ulcer.

Several studies performed in SARS-CoV-2 infected patients have reported a significant number of thrombotic events, mostly of venous etiology. Arterial ischemic events seem to be less frequent, however they have been described in COVID-19 patients without atherosclerosis or significant stenosis on the affected vessels [2]. The incidence of arterial events in COVID-19 varies between 2 and 5% [3]. Fournier et al. described 30 cases of arterial thrombotic events out of 531 patients admitted with COVID-19 (corresponding to 5.6%), most of which consisted of stroke, myocardial infarction, or acute/subacute limb ischemia. Patients infected with the SARS-CoV-2 virus were more likely to develop atypical patterns like massive aortic thrombosis [4].

## CASE REPORT

A 66-year-old male, diagnosed with COVID-19 10 days earlier by RT-PCR test, went to the Emergency Room with complaints of dry cough, dyspnea while performing small efforts and thoracalgia of pleuritic characteristics. He also described anosmia, ageusia and anorexia.

The patient had a medical history of arterial hypertension, dyslipidemia, and hyperuricemia, being medicated for all these pathologies, with an angiotensin converting enzyme inhibitor plus a thiazide diuretic plus a calcium channel blocker association, a moderate-intensity statin and a xanthine oxidase enzyme inhibitor, respectively.

At admission he was tachycardic although hemodynamically stable, without discrepant differences between the blood tension values on both upper members, there were no signs of respiratory distress or changes on the peripheral pulses. Cardiopulmonary auscultation and the neurologic exam were also normal. Blood tests did not show any relevant changes either, with normal d-dimers and troponin values, and slightly increased C-reactive Protein (7 mg/L, normal value < 5 mg/L). The electrocardiogram showed sinus tachycardia.

A thoracic computed tomography scan was performed (Figure 1), where a filling defect of the aortic arch was visible. After exclusion of other differential diagnosis and a discussion between Internal Medicine, Cardiothoracic Surgery and Vascular Surgery, a diagnosis of AAS was assumed, possibly caused by COVID-19, with the disease being classified as mild. The patient was admitted on the Internal Medicine

Received: December 2022; Accepted after review: March 2023; Published: March 2023.





**Fig. 1.** Thoracic computed tomography at admission, showing the aortic filling defect (arrows).

ward for clinical surveillance and radiologic reevaluation, having started anticoagulation with low-molecular-weight heparin on therapeutic doses.

The patient had a favorable evolution throughout his 7-day hospitalization, progressively improving his complaints without radiologic aggravation of the thrombus on two follow-up exams (Figure 2). There were no signs of nephrotoxicity associated with the contrast substance of the exams. At the discharge date, after a multidisciplinary discussion, the patient initiated oral anticoagulation with subsequent reevaluation on a medical appointment.

## DISCUSSION

Studies aiming at the clinical impact and prognosis of COVID-19 have demonstrated an increase incidence of venous and arterial ischemic events. On a study performed with patients admitted at Intensive Care units, Klok et al. [5] showed an accumulated incidence of thrombotic events of 31% (27% venous thromboembolism and 4% arterial thrombotic events), even though these patients received standard doses of thromboprophylaxis.

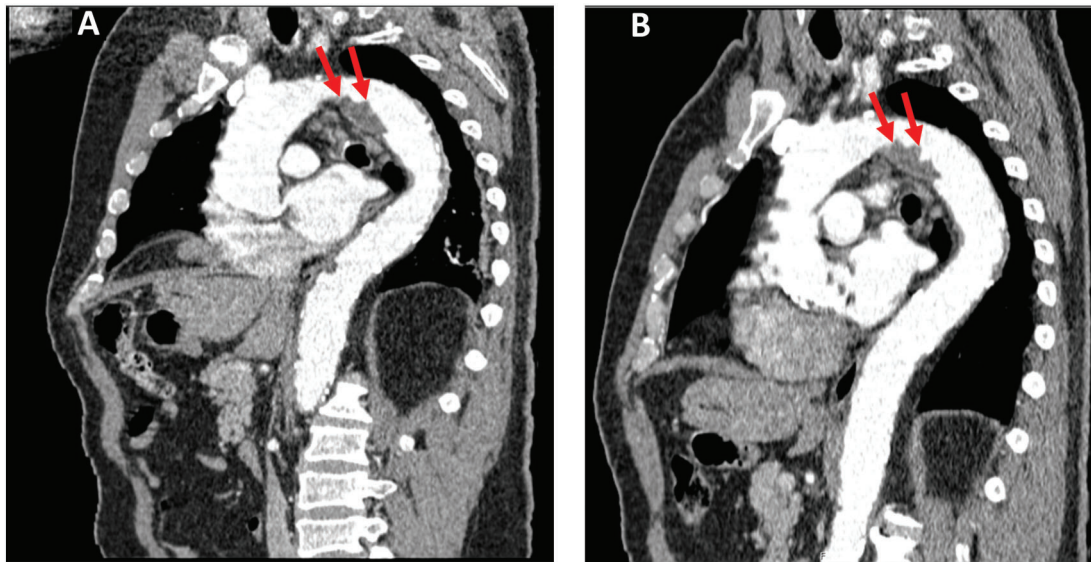
Such vascular repercussions can be explained by the pathophysiological mechanisms of COVID-19, which seem to have some characteristics in common with other already known processes of deregulation of the coagulation cascade, namely disseminated intravascular coagulation, antiphospholipid syndrome, thrombotic microangiopathy and hemophagocytic syndrome [6]. However, the pathophysiology of the SARS-CoV-2 virus has unique characteristics that distinguishes it from the other processes. The levels of D-dimer and fibrinogen degradation products seem to be good early indicators of the clinical severity because they

are higher in severe forms of the disease than in mild ones [7]. D-dimer also appear to be a good predictor of the risk of arterial thrombotic events in COVID-19 patients [4]. On this patient, D-dimer levels were normal at admission, coincident with the severity of the disease, but an ischemic arterial event of this dimension would not be expected.

As for the approach of aortic thrombus, there are no standardized guidelines for its treatment. The medical approach requires anticoagulation, usually heparin or warfarin, to restrain the propagation of the thrombi. Surgical option is usually reserved for younger patients, those in whom conservative treatment is unsuccessful or with a low risk of perioperative complications [8]. In this case, it was considered that the lesion did not have emergent surgical indication and could be addressed in a more conservative approach.

Although rare, there are a few cases of aortic arch thrombus associated with COVID-19 described in the medical literature. Kashi et al. [9] reported 2 cases of asymptomatic aortic thrombus, both incidental diagnoses detected on a pulmonary angiography. Al-Mashdali et al. [10] reported the case of a patient, infected with the SARS-CoV-2 virus, with an embolic stroke originating from an aortic arch thrombus. Similar to our patient, these subjects had a history of cardiovascular disease and a medical approach was decided in all of them. However, unlike these cases, our patient developed symptoms related with the aortic thrombosis which raised concern about his clinical course and led to a multidisciplinary discussion.

It is important to highlight the positive evolution of this case, since the mortality in ischemic arterial events secondary to COVID-19 seems to be significantly higher than when these events have other etiologies [4].



**Fig. 2.** Thoracic computed tomography on the second day of the hospitalization (A) and at discharge (B), showing no aggravation of the lesion (arrows).

The incidence of thromboembolic events in SARS-CoV-2 infected patients seems to be related with the severity of COVID-19 [5], but this case did not have that correlation since, according to the World Health Organization scale, this infection was classified as mild. This fact alerts to the possibility of these arterial ischemic events to be associated with immunologic phenomena against the SARS-CoV-2 virus, which in some cases appear in patients with less significant clinical presentations or even in the absence of serious respiratory symptoms [2].

## CONCLUSION

The main goal of this paper is to report the case of a rare but potentially severe complication associated with COVID-19, which can occur even in cases classified as mild. This enhances how wide the pathological spectrum of this infection can be and the clinical repercussions that can derive from it, which makes its study increasingly more important for better implementation of therapeutic, epidemiologic, and social measures that can minimize its effects in public health.

## Conflicts of interest

The authors declare that they have no competing interests.

## Disclaimer

The views expressed in this case report are the authors' own.

## Disclosure statement

The authors have no relevant financial or nonfinancial relationships to disclose.

## Conflicts for publication

None.

## Informed Consent

Informed consent was obtained from the patient for publication of this case report and accompanying images.

## REFERENCES

1. Carpenter SW, Kodolitsch YV, Debus ES, et al. Acute aortic syndromes: definition, prognosis and treatment options. *J Cardiovasc Surg (Torino)*. 2014;55(2 Suppl 1):133-144. PMID: 24796906.
2. Vulliamy P, Jacob S, Davenport RA. Acute aorto-iliac and mesenteric arterial thromboses as presenting features of COVID-19. *Br J Haematol*. 2020;189(6):1053-1054. PMID: 32353183; PMCID: PMC7267618. doi: 10.1111/bjh.16760.
3. McBane RD 2<sup>nd</sup>. Arterial Thrombosis and Coronavirus Disease 2019. *Mayo Clin Proc*. 2021;96(2):274-276. PMID: 33549245; PMCID: PMC7758023. doi: 10.1016/j.mayocp.2020.12.009.
4. Fournier M, Faillie D, Dossier A, et al. Arterial Thrombotic Events in Adult Inpatients With COVID-19. *Mayo Clin Proc*. 2021;96(2):295-303. PMID: 33549252; PMCID: PMC7691140. doi: 10.1016/j.mayocp.2020.11.018.
5. Klok FA, Kruip MJHA, van der Meer NJM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res*. 2020;191:145-147. PMID: 32291094; PMCID: PMC7146714. doi: 10.1016/j.thromres.2020.04.013.
6. Iba T, Levy JH, Connors JM, et al. The unique characteristics of COVID-19 coagulopathy. *Crit Care*. 2020;24(1):360. PMID: 32552865; PMCID: PMC7301352. doi: 10.1186/s13054-020-03077-0.
7. Han H, Yang L, Liu R, et al. Prominent changes in blood coagulation of patients with SARS-CoV-2 infection. *Clin Chem Lab Med*. 2020; 58(7):1116-1120. PMID: 32172226. doi: 10.1515/cclm-2020-0188.
8. Singh DP, Basit H, Malik A, et al. Mural Thrombi. [Updated 2022 Jul 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK534294/> [Available at 03/18/2023].
9. Kashi M, Jacquin A, Dakhil B, et al. Severe arterial thrombosis associated with Covid-19 infection. *Thromb Res*. 2020;192:75-77. PMID: 32425264; PMCID: PMC7229939. doi: 10.1016/j.thromres.2020.05.025.
10. Al-Mashdali AF, Al-Dubai HN, Al-Warqi AF. Aortic arch thrombosis complicated by an embolic stroke in a patient with COVID-19: A case report. *Ann Med Surg (Lond)*. 2021;69:102760. PMID: 34457268; PMCID: PMC8381619. doi: 10.1016/j.amsu.2021.102760.