Floating thrombi of the ascending aorta and aortic arch in a patient with Covid-19 pneumonia

Thrombus flottant de l'aorte ascendante et de la crosse aortique chez un patient atteint de covid-19

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Abstract

Coronavirus disease 2019 (COVID-19) has been associated with a hypercoagulable state and endothelial inflammation in which patients can be at risk for developing venous and arterial thromboembolic events.

Floating aortic arch and ascending aorta thrombi is rarely found in clinical practice and is a dangerous source of systemic emboli.

The optimal treatment modality for floating thrombus occurring in the setting of COVID-19 remains unknown. Urgent surgical extirpation may be the best therapy option. Conservative treatment with anticoagulation may be considered in asymptomatic, inoperable or high-risk patients.

We report the case of floating thrombus in the ascending aorta in a patient with covid 19, without history of aortic disease who was treated with curative anticoagulation.

Keywords

Ascending aorta - Aortic arch - Floating thrombus - Covid-19 - anticoagulant therapy

Summary

La maladie à coronavirus 2019 (COVID-19) a été associée à un état hypercoagulable et à une inflammation endothéliale dans lesquels les patients peuvent présenter un risque accru de développer des événements thromboemboliques veineux et artériels.

Les thrombis flottants de la crosse aortique et de l'aorte ascendante sont rarement rencontrés en pratique clinique et constituent une source dangereuse d'embolies systémiques.

La modalité de traitement optimale du thrombus flottant survenant dans le contexte du COVID-19 reste inconnue. L'extirpation chirurgicale urgente peut être la meilleure option thérapeutique. Un traitement conservateur par anticoagulation peut être envisagé chez les patients asymptomatiques, inopérables ou à haut risque notamment dans ce contexte d'infection COVID 19.

Nous rapportons le cas de thrombus flottant au niveau de l'aorte ascendante chez un patient atteint de covid 19, sans antécédent de maladie aortique et traité par anticoagulation curative.

Mots-clés

Aorte ascendante - arche aortique - thrombus flottant - Covid 19 - traitement anticoagulant

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INTRODUCTION

Since the outbreak of the coronavirus-2019 pandemic, increasing evidence suggests that infected patients present a high incidence of thrombotic complications. Coronavirus disease 2019 (COVID-19) is associated with endothelial inflammation and a hypercoagulable state resulting in both venous and arterial thromboembolic complications (1,2).

Aortic thrombosis is a rare event, but since the beginning of the current COVID-19 pandemic, aortic thrombosis has been increasingly reported in the literature, particularly with severe COVID-19 cases.

The ascending aorta floating thrombus has potentially fatal embolic complications (3,4), emergent treatement is mandatory. Treatment may include anticoagulation, thrombolytics, aortic surgery and endovascular approach.

We report the case of floating thrombus in the ascending aorta and aortic arch in a patient with covid 19, without history of aortic disease.

CASE REPORT

A 53-year-old man with no past medical history presented with a 10-day history of dyspnea, fever and abdominal pain.

On presentation, he was afebrile at 37,2°, hypoxic at 93%, and blood pressure was 120/80 mmHg.

He was tested positive for COVID-19 infection. Chest CT scan was performed after the persistance of the dyspnea. It showed bilateral ground-glass opacities with lung involvement of 25-50%, and showed CT two floating thrombi at the aortic arch : one in segment 1 and the other in the aortic arch (Figure 1) with splenic and only left renal infarction (Figure 2).

Initial laboratory investigations revealed absolute elevated D-dimer (1200 ng/mL), and C-reactive protein (111 mg/l).

Supplemental oxygen via nasal cannula (NC) was initiated with improvement of saturation to 98%.

The patient was treated with curative anticoagulation (unfractionated heparin) for 5 days, then low weight molecular heparin (LWMH) was started at an anticoagulant dose, with corticosteroids and antibiotics.

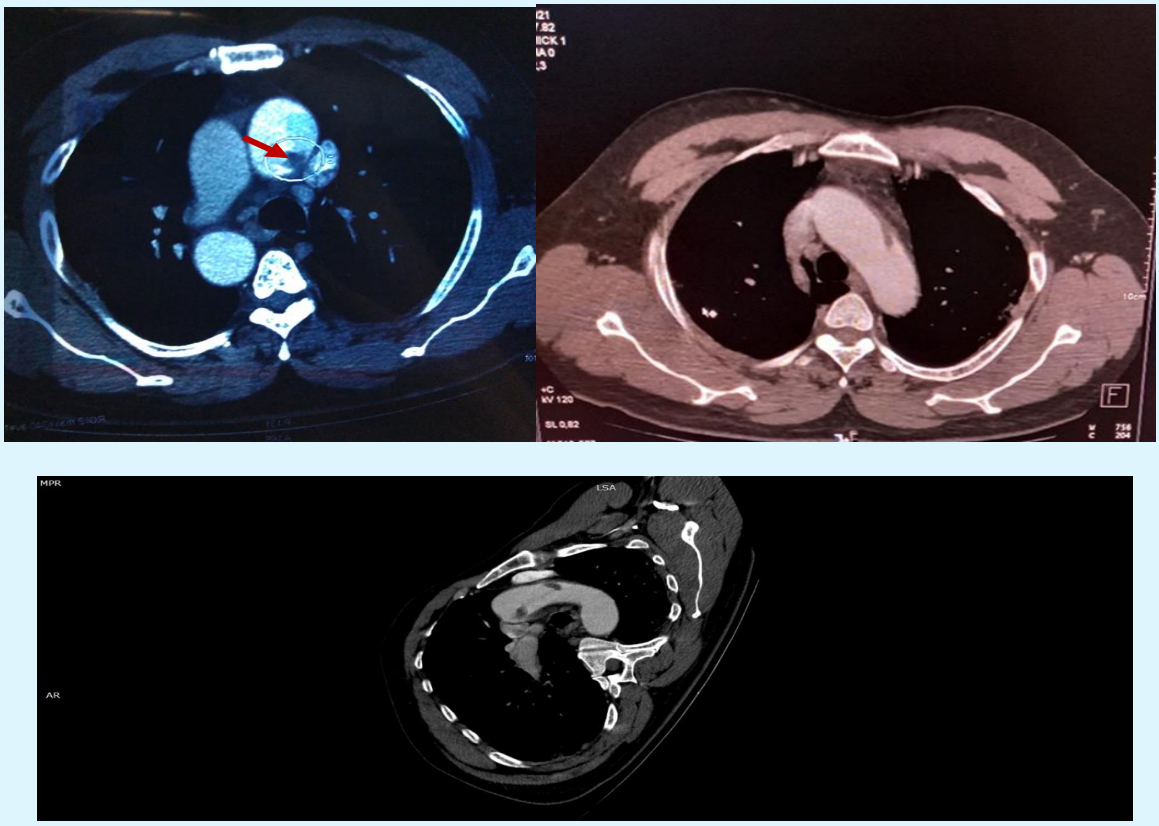

Figure 1. Aortic computed tomography scan showing floating thrombus in the ascending aorta and aortic arch (arrow).

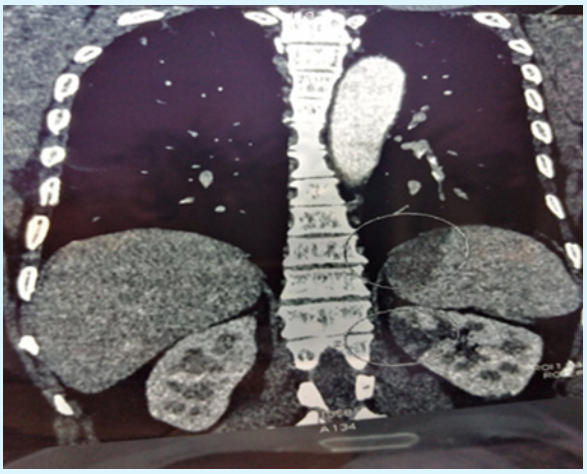

Figure 2. Computed tomography scan showing splenic and left renal infarction

After one week, there was a clear improvement in the respiratory state with ambient air saturation at 97%, with no embolic complication.

The control CT scan after 10 days to discuss open surgery, showed a total disappearance of the thrombus of segment I of the aorta and an almost total disappearance of the thrombus of the aortic arch, limited to a marginal thrombus 2 millimeters (Figure 3) , with bilateral kidney infaction .

Oral anticoagulation with non-vitamin K antagonist oral anticoagulants was started, the patient was discharged from the hospital.

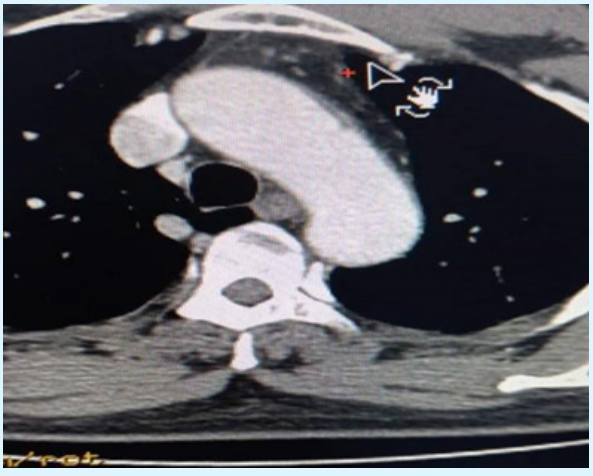

Figure 3. Control CT angiography showing a marginal thrombus 2 millimeters of the aortic arch.

DISCUSSION

The floating thrombus in the ascending aorta is a rare pathology, which may cause severe embolic complications (3,4), unstable structure and high blood velocity in the ascending aorta could cause thrombus to dislodge into the supra-aortic or peripheral vessels.

Intra-aortic thrombi formation is closely related to atherosclerotic lesions or hypercoagulable state due to genetic factors, other diseases or medical side effects (5).

Many authors have recently demonstrated a link between COVID-19 infection and thromboembolism. The pathophysiology of thromboembolism in COVID-19, may be associated with viral-mediated endothelial inflammation, in addition to hypercoagulability which is due to increased concentrations of coagulation factors (6).

The most frequently described report related to COVID-19 coagulopathy is an increase in plasma d-dimer levels. In many studies, D-dimer levels have been shown to predict the risk of increased thromboembolism in SARS-CoV-2, these studies have discussed the relationship between elevated d-dimer levels and prognosis (7,8).

There are numerous therapeutic options for the management of aortic mural thrombus. However, no definitive consensus on treatment of aortic thrombus exists, especially with patients with covid 19, who generally present with severe breathing problems and at very high anesthetic risk.

Long-term anticoagulation is commonly proposed as a first-line therapy (9), but surgical intervention may be necessary if anticoagulation is contraindicated, the thrombus progresses or mobilizes, or there is recurrent embolism.

In a meta-analysis recently published by Chen YY and al, 107 patients from 101 articles who are presenting ascending aortic thrombus were included, of whom 29 patients who received anticoagulation therapy and 59 who underwent open aortic surgery were included in the outcome analysis. Anticoagulation therapy and open aortic surgery for AAT show similar results; however, open aortic surgery reliably removes AAT and reduces the risk of recurrent embolization compared with anticoagulation therapy. Furthermore, the preoperative hemodynamic status significantly influences the clinical outcome and is a strong predictor of prognosis (10).

In the context of Covid 19, open surgical thrombectomy

carries high operative risks. Gandotra and al presented the case of aortic arch thrombus and pulmonary embolism in a covid-19 patient, who was treated with unfractionated heparin with partial resolution of the thrombus on the followup computed tomography and no in-hospital adverse events (11).

Carranza et al presented case-series of 3 patients, with ascending and descending aortic thrombosis caused by SARS-CoV-2 treated with anticoagulation therapy with different outcomes (12).

Two cases of emergent surgical extirpation of a large floating thrombus of the ascending aorta in patients with recent SARS-CoV-2 infection have been reported with favourable outcomes. Surgery was performed by median sternotomy for both cases. For the first patient, the cardiopulmonary bypass was established between the right atrium and the right axillary artery. Under selective antegrade cerebral perfusion and mild (28°C) systemic hypothermic circulatory arrest, the aorta was opened and the thrombus was found at the base of the brachiocephalic trunk. The entire ascending aorta was resected, removing the thrombus and its site of implantation, and replaced by a Dacron tube (13). For the second case report the cardio-pulmonary bypass was performed by the right femoral artery and the right atrial appendage cannulation, and the patient was cooled down to 20°C, thrombus was removed entirely and part of ascending aorta was resected and replaced with Dacron tubular graft (14). All the patients treated by surgery had an uneventful postoperative course with no recurrent thrombus or embolic event during follow-up.

Less-aggressive approaches such as percutaneous thromboaspiration and endovascular repair may be a solution in highly selected cases, taking into consideration the risks and benefits of open surgical treatment and of prolonged anticoagulation, which, as of today, remain the gold standards (15, 16, 17).

A case report of mobile thrombus in the distal aortic arch and the proximal descending aorta in a patient with COVID-19, treated with percutaneous vacuum-assisted thrombectomy (angio-VAC), was recently published (18).

Finally, use of anticoagulants in COVID-19 to prevent arterial and venous thrombosis, remains a challenge with no definite guidelines published to date highlighting the timing, dosage and duration of anticoagulation as well as the molecule of choice.

Recently, Khider and al (19) showed that curative anticoagulation could prevent COVID-19-associated coagulopathy and endothelial lesion.

CONCLUSION

There is no consensus concerning the adequate treatment of floating thrombus of the ascending aorta, but surgery can avoid the risk of cerebral, visceral and peripheral embolization according to several authors.

Several other publications have shown the effectiveness of anticoagulant treatment, which allowed the total or subtotal disappearance of the thrombus without embolic incidents as in our case.

The anticoagulant treatment alone in the floating thrombi of the ascending aorta and the aortic arch, can be the only effective treatment in these patients with covid 19 and high operative and anesthetic risk.

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