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CASE REPORT

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Acute pulmonary embolism following acute type A aortic dissection in a patient with COVID-19

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Abstract

Acute aortic dissection and acute pulmonary embolism (PE) are life-threatening emergencies that can mimic each other at presentation. Immediate and accurate diagnosis of these scenarios is crucial to initiate the appropriate interventions. In this case report we present a 73-year-old patient, who was admitted to our Medical Center with acute type A aortic dissection. She was tested for coronavirus disease 2019 (COVID-19) infection and was found to be positive. During her admission in the COVID-19 designated intensive care unit, she diagnosed with acute PE in the main right and left pulmonary arteries. She underwent surgery that included bilateral pulmonary embolectomy and aortic dissection repair. The patient was discharged from our hospital on the ninth postoperative day without any complications. Frequency of simultaneous presentation of acute aortic dissection and acute PE is increased with a history of coagulation abnormalities as seen in patients with COVID-19.

KEYWORDS

COVID-19, pulmonary embolism, type A aortic dissection

1 | INTRODUCTION

Acute chest pain is a common presenting complaint in the emergency department on a daily basis, as many diseases of the heart, aorta, lungs, stomach, mediastinum, and so forth may cause chest discomfort.[1] Type A aortic dissection is a surgical emergency that occurs when an intimal tear in the aorta creates a false lumen in the ascending aorta. Emergent surgical repair is required and includes replacement of the dissected aorta.[2]

Hypercoagulable states increase the risk for the development of blood clots. Severe coagulation abnormalities are presented in nearly 20% of patients with coronavirus disease 2019 (COVID-19).[3,4] The coagulation changes suggest the presence of a hypercoagulable state that increases the risk of thromboembolic complications.[3]

We present here a rare case that was diagnosed and successfully treated with ascending aorta replacement for type A aorta dissection repair and pulmonary embolectomy, in a patient who tested positive for COVID-19.

1.1 | Case report

A 73-year-old female, independent and in a good mental state, with a history of venous insufficiency, impaired fasting glucose and hyperlipidemia, was admitted to our Medical Center with central chest pain of two days' duration. The pain was described as sharp, radiating to the left arm and associated with shivering. Computed tomography angiography (CTA) demonstrated a type A aorta dissection that start proximal to the brachiocephalic artery and continue to the aortic arch with an intimal flap in the ascending aorta and aortic arch. The brachiocephalic trunk, left carotid, and left subclavian arteries were spared (Figure 1). Since the patient came from an endemic area she was tested for COVID-19 infection and was found to be positive. Due to the positive result and hemodynamic stability, cardiac surgery was postponed with the patient under intensive monitoring with tight blood pressure control and mobilization's restriction in the COVID-19 designated intensive care unit of our hospital. During her whole preoperative course the patient was hemodynamically stable and asymptomatic. Her pulse was in sinus rhythm

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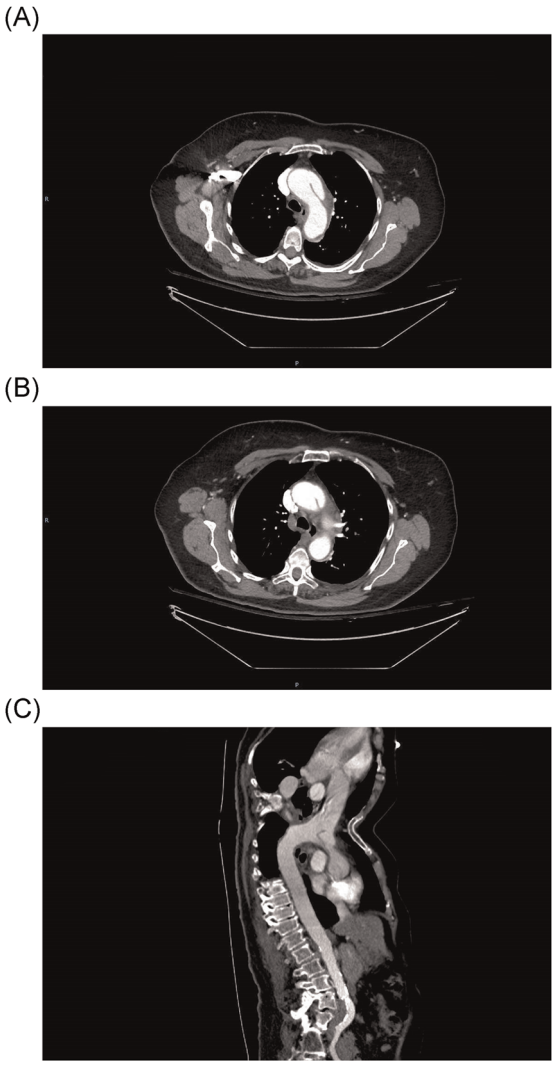

FIGURE 1 Computed tomography angiography showing type A aortic dissection in axial (A) and (B) and sagittal (C) views

around 60 bpm, systolic blood pressure around 100–110 mmHg under intravenous Beta blockers, Labetolol, and with oxygen saturation around 94%–95% on room air without any speech dyspnea. She did not require any respiratory support and did not receive any antiviral treatment for COVID-19. Furthermore she was not treated by any anticoagulation therapy because of the aortic dissection and the possibility of emergent surgery. Yet, she was treated by pneumatic compression device on both her legs to prevent deep vein thrombosis and PE. Two weeks later and after negative tests for COVID-19, the patient underwent an additional CTA a day before her surgery as a routine examination rather than due to any clinic changes in her situation, to see if there is any progression in the aortic dissection, that demonstrated no progression in the aortic dissection, but a new large bilateral pulmonary embolism in the main right and left pulmonary arteries (Figure 2).

Sixteen days following the initial diagnosis of aortic dissection, the patient underwent surgery that included bilateral pulmonary embolectomy and aortic dissection repair by replacing the ascending aorta and hemiarch with a Dacron Tube Graft 28 mm during deep hypothermic circulatory arrest. The cross-clamp time was 78 min and the circulatory

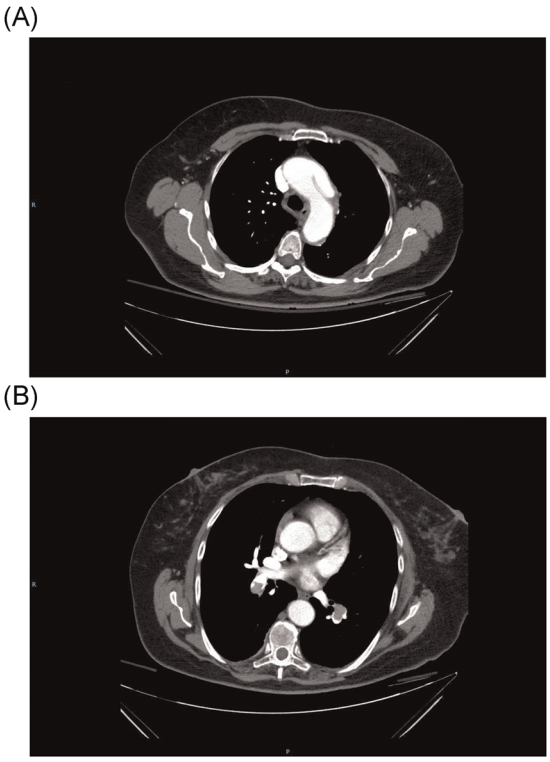

FIGURE 2 Computed tomography angiography showing type A aortic arch dissection (A) and right and left pulmonary embolism (B)

arrest time was 29 min. The patient was extubated and transferred to the stepdown ward on the first postoperative day. On the second postoperative day, we started treatment with anticoagulation therapy, by Apixaban in full dose twice a day.

The patient was discharged from our hospital on the ninth postoperative day with the same anticoagulation therapy and without any complications. The patient was followed-up in our outpatient clinic eight weeks after she was discharged home. In her last follow-up, the patient recovered totally from her hospital course, was classified with NYHA functional Class I and reported that she is in a good mental state. She was free from any symptoms, including angina or dyspnea. Follow-up CTA twelve weeks postoperative demonstrated good result of the aortic repair and PE repair (Figures 3 and 4).

2 | DISCUSSION

Acute aortic syndrome is one of the most potentially fatal pathologic processes within the aortic wall, which should be suspected in all patients presenting with acute chest or back pain and hypotension. The most frequent presenting symptoms of pulmonary embolism (PE) are dyspnea and pleuritic chest pain. A hypercoagulable state increases the risk for blood clot formation which can lead to thromboembolic complications such as PE. Some studies show a high incidence of thromboembolic complications in patients with COVID-19.[3]

There are two classifications for acute aortic syndrome: Stanford and DeBakey. Stanford type A lesions involve the ascending aorta

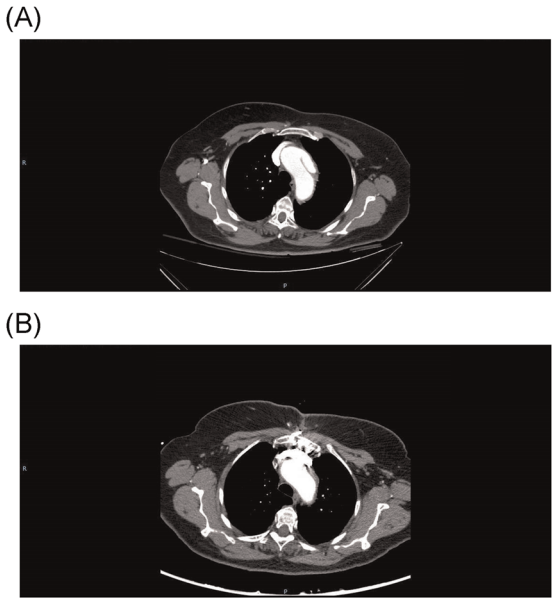

FIGURE 3 Computed tomography angiography showing the type A aortic dissection pre-op (A) and post-op (B) in axial view

with or without extension to the descending aorta, whereas type B lesions are confined only to the descending aorta.[5]

In epidemiological studies, the incidence of acute aortic dissection is approximately 3.5–6.0 per 100,000 patient-years[6] and the annual incidence rates for PE range from 39 to 115 per 100,000 patients.[7] The combined presentation of these two is very rare.

Immediate and accurate diagnosis is imperative as an emergency surgical procedure and is frequently necessary. Available data suggest that open heart surgical repair is the optimal treatment for type A aortic dissection.[6]

In our case, the patient presented with sharp chest pain without other symptoms. The positive test for COVID-19 and the time that passed between the first CTA and the date of surgery, led us to repeat the CT scan that demonstrated new blood clots in the pulmonary arteries.

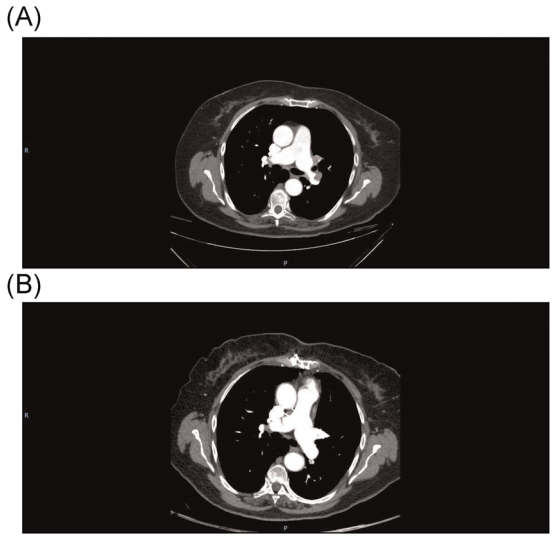

FIGURE 4 Computed tomography angiography showing the pulmonary embolism pre-op (A) and post-op (B) in axial view

3 | CONCLUSIONS

Acute aortic dissection and acute pulmonary embolism can mimic each other clinically. Rapid and accurate diagnosis is crucial to establish correct treatment.

While acute aortic dissection and acute pulmonary embolism are very rare, they could present simultaneously, especially where there is a history of coagulation abnormalities as seen in patients with COVID-19.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

ETHICS STATEMENT

The study was approved by the Institutional Review Board with a waiver of informed consent.

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