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A Severe COVID-19 Case Complicated by Right Atrium Thrombus

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: None declared

Patient: Male, 73-year-old
Final Diagnosis: Severe COVID-19 pneumonia complicated by right atrium thrombus
Symptoms: Fever • dyspnea • cough
Medication: —
Clinical Procedure: —
Specialty: Critical Care Medicine

Objective: Educational purpose

Background: Recent studies demonstrated evidence of coagulation dysfunction in hospitalized patients with severe coronavirus disease 2019 (COVID-19) due to excessive inflammation, hypoxia, platelet activation, endothelial dysfunction, and stasis. Effective anticoagulation therapy may play a dominant role in the management of severe COVID-19 cases.

Case Report: A 73-year-old man with a 6-day history of fever up to 38.5°C, dyspnea, cough, and fatigue was diagnosed with COVID-19. He had a past medical history significant for hypertension and coronary artery bypass grafting. Two days after hospital admission, the patient developed acute respiratory failure, requiring intubation, mechanical ventilation, and transfer to the intensive care unit (ICU). He received treatment including antibiotics, hydroxychloroquine, tocilizumab, vasopressors, prone positioning, and anticoagulation with enoxaparin at a prophylactic dose. After a 15-day ICU stay, the patient was hemodynamically stable but still hypoxemic; a transthoracic echocardiogram at that time, followed by a transesophageal echocardiogram for better evaluation, revealed the presence of a right atrium thrombus without signs of acute right ventricular dilatation and impaired systolic function. Since the patient was hemodynamically stable, we decided to treat him with conventional anticoagulation under close monitoring for signs of hemodynamic deterioration; thus, the prophylactic dose of enoxaparin was replaced by therapeutic dosing, which was a key component of the patient's successful outcome. Over the next few days he showed significant clinical improvement. The follow-up transesophageal echocardiogram 3 weeks after effective therapeutic anticoagulation revealed no signs of right heart thrombus.

Conclusions: The presented COVID-19 case, one of the first reported cases with evidence of right heart thrombus by transesophageal echocardiography, highlights the central role of diagnostic imaging strategies and the importance of adequate anticoagulation therapy in the management of severe COVID-19 cases in the ICU.

MeSH Keywords: Anticoagulants • COVID-19 • Echocardiography • Thrombosis

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/926915

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Background

The coronavirus disease of 2019 (COVID-19) is a viral illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2). The World Health Organization has recently declared COVID-19 a public health emergency of international concern. Patients with older age and comorbidities such as cardiovascular disease are at higher risk for severe disease. Common laboratory abnormalities found in patients with COVID-19 include lymphopenia and elevation in lactate dehydrogenase (LDH) and inflammatory markers such as C-reactive protein (CRP), D-dimers, ferritin, and interleukin-6 (IL-6). Older age, higher sequential organ failure assessment (SOFA) score, and elevated D-dimers at hospital admission are risk factors for death [1–4]. Data analysis of the clinical characteristics of 1099 Chinese patients with confirmed COVID-19 showed that 5% of patients required Intensive Care Unit (ICU) admission, 2.3% underwent invasive mechanical ventilation and 1.4% died [1]. COVID-19 may predispose patients to thrombotic disease in both venous and arterial circulations because of excessive inflammation, hypoxia, platelet activation, endothelial dysfunction, and stasis [2,4–6].

Recent studies underline the importance of venous thromboembolic events in severe COVID-19 patients. The reported incidence of thrombotic complications in patients with COVID-19 requiring ICU admission is high, ranging from 20.6% to 31%. [6–10]. It is notable that at least half of thromboembolic events were diagnosed within the first 24 h of admission, and thus were not preventable by the initial in-hospital thromboprophylactic anticoagulation [8,10]. In addition, the low number of associated deep venous thromboses in COVID-19 patients may suggest the presence of pulmonary thrombosis rather than embolism [7,11].

We report our experience to highlight the crucial role of efficient anticoagulation therapy in the management of severe COVID-19 cases requiring ICU admission; the importance of diagnostic imaging strategies, including transesophageal echocardiography, is also emphasized.

Case Report

A 73-year-old man presented to the emergency room after 6 days of fever up to 38.5°C, dyspnea, cough with some yellowish sputum, and fatigue. The physical examination showed respiratory rate 30/min, arterial oxygen saturation 91% on 3 L of supplemental oxygen, blood pressure 125/75 mmHg, heart rate 88/min, and chest auscultation revealed bilateral coarse crackles in the lungs. No leg swelling or signs of deep venous thrombosis were present.

His past medical history included hypertension and coronary artery bypass grafting 2 years earlier; he was receiving combination therapy for hypertension, and acetylsalicylic acid 100 mg/day. He had no known personal or family history of hypercoagulability.

The computed tomography of the lungs showed bilateral multifocal ground-glass opacities. No lower-extremity venous ultrasound was performed. The white blood cell count was 13 800/μL (lymphocyte count 1104/μL, 8%), whereas all markers of infection were increased (ferritin 2760 ng/mL, CRP 276 mg/L, procalcitonin 1.68 μg/L, D-dimers 2098 ng/mL, LDH 392 U/L). The differential diagnosis included community-acquired pneumonia, atypical pneumonia, and COVID-19.

The patient was initially treated with azithromycin 500 mg intravenously (IV) once daily and ampicillin/sulbactam 3 gr IV, 3 times daily. Prophylactic dose for thromboembolism with enoxaparin was also initiated, and therapy with acetylsalicylic acid was maintained. After the testing for SARS-CoV-2 infection by real-time polymerase chain reaction by nasopharyngeal swab, which came out positive the next day, hydroxychloroquine was added to his therapy according to our hospital protocol, with 400 mg twice daily on the first day and 200 mg 3 times daily for the next 5 days.

Nevertheless, the patient's condition rapidly deteriorated, and he required intubation and mechanical ventilation 2 days after hospital admission; at that time, a central line into the right internal jugular vein was also inserted. Thereafter, he was admitted to the ICU for further management; his SOFA score at ICU admission was 8.

During the next few days, the patient was febrile, hypoxemic, and hemodynamically unstable, requiring vasopressors; he received tocilizumab (IL-6 inhibitor) and antibiotics including ceftaroline, meropenem, colistin, and linezolid. He was treated for severe acute respiratory distress syndrome, including prone positioning for 3 days, with beneficial effects. He continued to receive enoxaparin at prophylactic dose for thromboembolism and acetylsalicylic acid; no other treatment modalities for immobilization were applied.

Two weeks after the ICU admission, the patient was afebrile and hemodynamically stable, but still hypoxemic with a PaO_2/FiO_2 ratio of 122 mmHg, requiring continuation of mechanical ventilation. At that time a transthoracic echocardiogram, followed by a transesophageal echocardiogram for better evaluation, revealed the presence of a right atrium thrombus (Figure 1) without signs of acute right ventricular dilatation and impaired systolic function; a pulmonary embolism (PE) might also have occurred. Since the patient was hemodynamically stable and the levels of cardiac troponin T were not elevated

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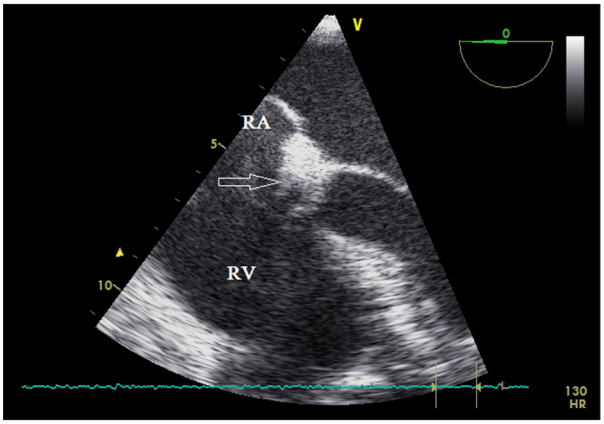

Figure 1. Transesophageal echocardiography, mid-esophageal 4-chamber view (intensive care unit day 15): thrombus in the right atrium (arrow). RA – right atrium; RV – right ventricle.

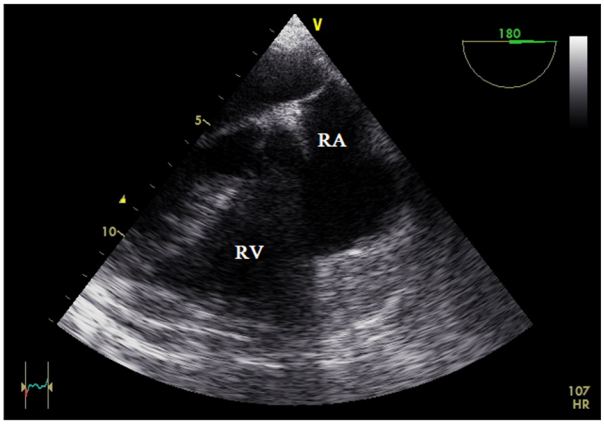

Figure 2. Transesophageal echocardiography, mid-esophageal 4-chamber view (intensive care unit day 36): no evidence of residual thrombus. RA – right atrium; RV – right ventricle.

(12 pg/mL), we decided to treat him with conventional anticoagulation, consisting of an increased dose of enoxaparin, 80 mg subcutaneously (SC) twice daily, to attain therapeutic anti-Xa levels (0.8–1.2 U/mL). In addition, the patient was under close monitoring for signs of hemodynamic deterioration or massive PE; initiation of systemic thrombolysis would immediately follow in this scenario. On the basis of the abovementioned anticoagulation treatment and related monitoring, we chose not to transfer the patient to radiology for PE assessment. No other tests for genetic or acquired hypercoagulable states were done at that time. During the next few days the patient had significant clinical improvement; the follow-up transesophageal echocardiogram 3 weeks after effective therapeutic anticoagulation revealed no signs of right heart thrombus (Figure 2). The patient remained hemodynamically stable, maintaining a PaO_2/FiO_2 ratio of 290 mmHg, without need of mechanical ventilation. He was in a process of tracheostomy closure and ICU discharge to a rehabilitation facility.

Discussion

Recent data have shown that SARS-CoV-2 infection and the associated systemic inflammatory storm in severe cases results in endothelial dysfunction and activation of the coagulation cascade. There is an ongoing discussion regarding the effectiveness of routine prophylactic anticoagulation therapy in preventing thrombotic complications in severe COVID-19 cases [10–12].

The presence of the right atrium thrombus in our patient, who was already in prophylactic anticoagulation therapy, generates some questions. How long was the thrombus in the right atrium? Could it be related to the coagulation dysfunction observed in COVID-19, as part of the initial presentation? Could it be associated with the stasis, hemodynamic instability, mechanical ventilation, or central line placement during the ICU stay? Is the therapeutic coagulation after the thrombus diagnosis a crucial therapeutic intervention for the final outcome of the patient? Finally, what is the appropriate initial anticoagulation therapy for severe COVID-19 cases admitted in the ICU?

As the computed tomography of the lungs at the time of COVID-19 diagnosis was without contrast, we do not have information regarding the presence of the right heart thrombus or even pulmonary embolism at ICU admission. However, we do know that after the change of prophylactic anticoagulation to therapeutic dosing, the transesophageal echocardiogram revealed no signs of residual right atrium thrombus and the patient had continuous significant improvement in both hemodynamics and oxygenation.

We should emphasize the critical role of transesophageal echocardiography in the management of the patient by providing reliable and safe information. The detection of intracardiac thrombus or clot in transit by transthoracic and transesophageal echocardiography, and the subsequent therapeutic interventions, have been recently reported in a few cases with severe COVID-19 [13–17]. Currently, transesophageal echocardiography is strongly endorsed by experts as an invaluable tool for managing critically ill patients with COVID-19 [18].

Since we are at the beginning of studying COVID-19 complications, we cannot have sufficient answers to questions arising from the challenges and management issues of severe COVID-19 cases. However, it seems that thromboembolic complications are common in patients with severe COVID-19 requiring ICU care, and low-molecular-weight heparins may be preferred in patients unlikely to need procedures. The optimal initial dose remains unknown; some physicians consider

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that prophylactic anticoagulation is needed, whereas others think that therapeutic anticoagulation is reasonably necessary [4,10,11,19].

Conclusions

The presented COVID-19 case, one of first to provide evidence of right heart thrombus by transesophageal echocardiography, highlights the central role of diagnostic imaging strategies and the importance of adequate anticoagulation therapy in the management of severe COVID-19 cases.

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Conflicts of interest

None.

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