CASE REPORT

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Late Onset, Hospital Acquired Infective Endocarditis After COVID-19

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ABSTRACT Scientists worked on the diagnosis and treatment of coronavirus disease-2019 (COVID-19) in the beginning of the pandemic, which started in December 2019. However, as time goes by, we began to face the long-term complications of COVID-19. Arrhythmias, myocarditis, myocardial infarction, thromboembolic events are cardiovascular complications that we frequently encounter. Severe acute respiratory syndrome-coronavirus-2; attaches to the angiotensin-converting enzyme 2 receptor to enter the cell, which is overexpressed in pericytes. This binding causes endothelial activation and inflammation. Inflamed endothelium becomes susceptible to attachment of microorganisms, particularly staphylococci, and may lead infection of endocardium and so infective endocarditis. There are cases of infective endocarditis described in the literature, that occur early or late after suffering from COVID-19. In this study, we mentioned about a case diagnosed as healthcare-associated infective endocarditis. The patient had a history of COVID-19 and hospitalization due to late complications and developed infective endocarditis after 10 days of discharge.

Keywords: Infective endocarditis; COVID-19; pathogenesis; risk factor

After the first case seen in December 2019; the coronavirus disease-2019 (COVID-19) pandemic shook the world with 765 million patients and 6.9 million known deaths in the last 3 years.[1] COVID-19, a complex multisystem disorder; may appear in a wide range from asymptomatic infection to multiorgan failure and death. It is known that one of the most important steps in the pathogenesis of complications, that we have difficulty in coping with, are endothelial activation, dysfunction, and inflammation.[2]

The presence of patients diagnosed with infective endocarditis concurrently or late after COVID-19 suggests that endothelial damage caused by the disease may predispose to infective endocarditis.[3,4]

CASE REPORT

An 84-year-old female patient with known hypertension and dementia was brought to the emergency department due to sudden onset of respiratory distress and impaired consciousness. She was diagnosed as COVID-19 with positive result of polymerized chain reaction testing of nasopharyngeal swab sample three months before her admission. During that period, the patient did not have any complaints other than fatigue and passed the disease by resting at home. Two months later; she was hospitalized because of malnutrition and progressive deterioration in her cognitive functions after suffering from COVID-19. Treatment for dementia was arranged, and feeding

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with a nasogastric tube was started. She didn't have fever and undergo any invasive procedures during follow-up and was discharged after her general condition improved. She was taken to hospital 10 days after discharge. In physical examination, her fever was 36.5°C, blood pressure: 110/80 mmHg, pulse: 80 bpm, consciousness tended to sleep, and no abnormal findings were found in other system examinations. In the laboratory evaluation white blood cells: 14,100 Ul, urea: 226 mg/dL, creatinine 1.76 mg/dL, C-reactive protein (CRP): 199 mg/L, troponin I: 6132 ng/L (0-15.6), creatine kinase MB: 1.0 ng/mL (0-3.1). Multiple lacunar infarcts were detected in the computerized cranial tomography. In the electrocardiogram there were changes consistent with inferior myocardial infarctus (MI). In transthoracic echocardiography, inferior myocardium wall's middle and basal parts were hypokinetic, left ventricular segmental wall motion defect, left ventricular concentric hypertrophy, 16x6 mm vegetation under the mitral valve posterior leaflet prolapsing into the left ventricle with diastole, disrupting valve integrity, advanced aortic valve stenosis, moderate-to-advanced mitral valve regurgitation was detected (Figure 1). It was noticed that she had been in a routine follow up for moderate aortic stenosis and moderate to severe mitral stenosis till the last 2 years. The patient was hospitalized in the coronary intensive care unit with the diagnosis of subacute inferior MI and infective endocarditis. Considering the general condition of the patient percutaneous coronary intervention was not planned. Anti-ischemic medical treatment was arranged according to the current treatment guidelines.

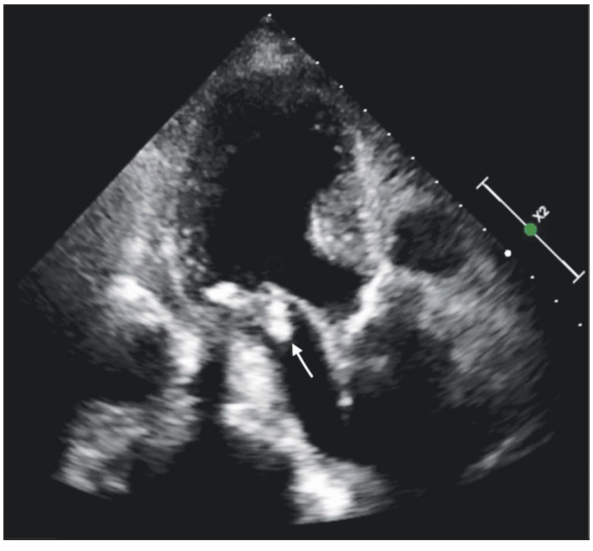

FIGURE 1: Echocardiographic image of the mitral valve vegetation.

The patient was consulted to the infectious diseases department and treated with meropenem and vancomycin after taking blood cultures with the diagnosis of health care- assocaiated infections and possible infective endocarditis. Her clinical condition improved with antibiotics and other medical treatments, and a regression in blood leukocyte and CRP values was observed. *Staphylococcus caprae* was identified in all 3 sets of blood cultures taken at hospitalization. The patient developed decompensated heart failure during the follow-up and died on the 10th day of follow-up before we could de-escalate her antibiotic treatment.

An informed consent form was obtained from the patient's first-degree relatives.

DISCUSSION

The causative agent of COVID-19 is the severe acute respiratory syndrome-coronavirus-2 virus which uses angiotensin-converting enzyme 2 receptors to enter the cell, shows its primary effect in the lower respiratory tract. These receptors are also highly expressed in pericytes causing cardiovascular complications. Often arrhythmias, less rarely myocarditis, endocarditis, myocardial infarction and thromboembolic events may develop. In the CAPACITY-COVID study, which evaluated cardiac complications in patients hospitalized with the diagnosis of COVID-19; cardiac involvement was observed in 11.6% of the 3,011 patients included, atrial fibrillation developed most frequently, infective endocarditis developed in 4 patients, and 2 of them died.[5] Entering the virus to the pericyte causes endothelial damage and microvascular dysfunction. This leads to uncontrolled release of chemoattractants; increases binding of leukocytes to the endothelium, causes their adhesion and transmigration and so endothelial inflammation. Also increased cytokine release or direct endothelial invasion in COVID-19 cause endothelial activation.[2,6] Endothelial damage is the most impor-

tant step in the pathogenesis of infective endocarditis.[7] A case of nonbacterial endocarditis, which was thought to develop due to the inflammatory process, was reported in a patient who did not have underlying heart valve disease and was known to have COVID-19, ın addition, another study mentioning a case of nonbacterial thrombotic endocarditis (NBTE), which is thought to be accompanied by subclinical COVID-19, stated that immune system activation and hyperinflammation due to COVID-19 may lead to NBTE.[8,9] Also there are cases of infective endocarditis that develop simultaneously or late after COVID-19.[3,10-13] Twelve studies of 15 cases were included in a systematic review evaluating infective endocarditis co-occurring with COVID-19, 73% of the patients had a native heart valve and 27% had a mechanical or bioprosthetic heart valve.[14] Our patient is one of the rare cases that developed infective endocarditis after COVID-19. We think that the healthcare-associated bacteremia that developed within 10 days of her hospitalisation due to the complications of COVID-19 and the endothelial damage caused by COVID-19 are the steps in the development of infective endocarditis. Even if months have passed since COVID-19; it should be kept in mind that cardiovascular complications may occur in the following period, and even a history of COVID-19 may be a risk factor for infective endocarditis. There are many points that we still don't know and need to be investigated about the diagnosis, treatment, and complications of COVID-19.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Aybegüm Özşahin;* ***Design:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz;* ***Control/Supervision:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz, İlknur Esen Yıldız, Uğur Kostaklıoğlu, Ayşe Ertürk;* ***Data Collection and/or Processing:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz;* ***Analysis and/or Interpretation:*** *Aybegüm Özşahin, İlknur Esen Yıldız, Uğur Kostaklıoğlu;* ***Literature Review:*** *Aybegüm Özşahin, Ayşe Ertürk;* ***Writing the Article:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz;* ***Critical Review:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz;* ***References and Fundings:*** *Aybegüm Özşahin, İlknur Esen Yıldız, Uğur Kostaklıoğlu, Ayşe Ertürk;* ***Materials:*** *Aybegüm Özşahin, Ahmet Seyda Yılmaz.*

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