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CASE REPORT

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Left ventricular thrombus formation in a COVID-19 patient with a complex course of pericarditis and myocardial infarction

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Key Clinical Message

Our case demonstrated that thrombotic complications such as coronary thrombosis and left ventricular clot could occur even in coronavirus disease 2019 (COVID-19) patients with nonspecific symptoms which indicates the mysterious face of COVID-19. This complex process highlights the necessity of screening patients for COVID-19 disease even with nonspecific cardiac symptoms.

KEYWORDS

COVID-19, left ventricular thrombus formation, myocardial infarction, pericarditis

1 | BACKGROUND

Pericarditis, inflammation of the pericardium, is the most prevalent pericardial disease and a prominent cause of acute chest discomfort in young people.[1] It is mostly caused by viral infections as well as rheumatic illnesses, uremia, or neoplasms.[2] A pericardial friction rub, concave ST-segment elevations, pleuritic chest discomfort, and pericardial effusion are all common indications and symptoms.[1] Given that pericarditis is generally self-limited, the therapy is usually supportive, including nonsteroidal anti-inflammatory medications or colchicine. Other causes of pericarditis, on the other hand, may have different prognosis and therapeutic implications.[3,4]

Up to 15% over all acute myocardial infarction (AMI) patients and 25% of individuals with anterior myocardial infarction suffer from a left ventricular thrombus (LVT).[5,6] With the introduction of early percutaneous coronary intervention (PCI) as a widely used treatment of AMI, the incidence of LVT decreased dramatically. LVT is most typically seen in patients with late-onset MI in clinical practice. It is infrequently seen in patients who report early and receive fast revascularization, especially in the first 24 h after an AMI.[7]

Coronavirus disease 2019 (COVID-19) has grown significantly in scale as a result of the development of the novel zoonotic severe acute respiratory syndrome coronavirus-2. In addition to the predominance of respiratory symptoms, cardiovascular problems have also been reported.[8]

A COVID-19 patient with ST elevation MI and LV thrombus with signs and symptoms of pericarditis was introduced.

2 | CASE PRESENTATION

A 38-year-old man with a history of upper respiratory infection 10 days before admission and no risk factor for cardiac disease was presented with pleuritic chest pain that

radiates to the scapula and shoulders, exacerbated by deep inspiration and in supine position, nausea, diarrhea, and cough starting 3 days prior to admission.

Physical examinations, vital signs included blood pressure of 110/70 mmHg, pulse rate of 87 beats/min, respiratory rate of 23/min, oximetry of 90% on room air, and a temperature of 38.5°C (101°F).

The patient's chest pain improved on the first day of admission and electrocardiography revealed diffuse ST-segment elevation (Figure 1).

Echocardiography showed a reduced ejection fraction (left ventricular ejection fraction [LVEF] = 45%), and the serum troponin (hsTn) was equal to 36 (normal range: 34). An initial plan for medical treatment of acute pericarditis was in place when the patient was admitted to the hospital.

Infectious diseases consultant added vancomycin 2 gr twice a day and meropenem 1 gr three times a day to the treatment.

A spiral lung computed tomography (CT) scan showed no evidence in favor of covid and infectious diseases.

Laboratory evaluations such as viral, inflammatory, and coagulation markers were normal. All hypercoagulability tests (activated protein C resistance, beta-2 glycoprotein antibodies, protein S activity, and homocysteine) were normal.

On the next day of admission, the patient's pleuritic chest pain changed to typical pain and felt as a feeling of pressure. In addition, serum troponin reached 27,185, and SARS-CoV-2 PCR became positive.

Electrocardiogram showed diffuse ST-segment elevation and increased ST elevation in precordial leads (Figure 2).

Echocardiography indicated a large left ventricle (LV) apical clot size (3.1 cm × 1.5 cm) and moderate LV systolic dysfunction (LVEF 35%).

Due to the rise of serum troponin and LV clots, an intravenous injection of unfractionated heparin was started, and the patient underwent angiography. The results disclosed a heavy thrombotic lesion on the left anterior descending artery (Figure 3).

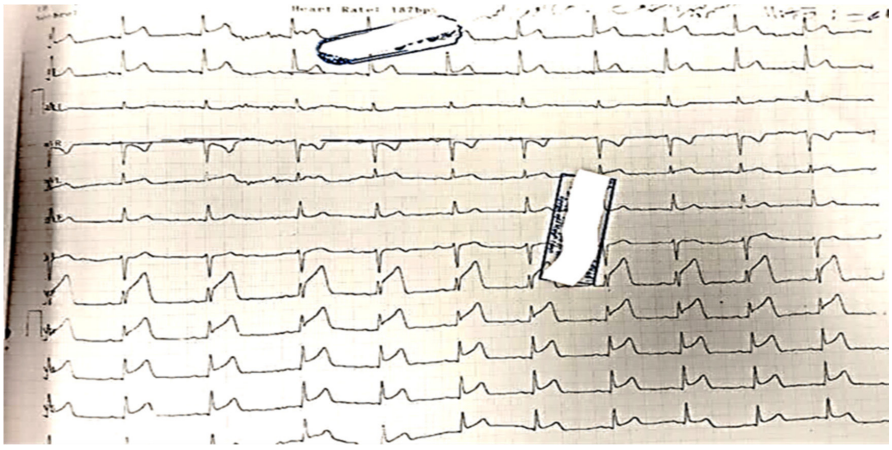

FIGURE 1 Electrocardiogram presenting diffuse ST-segment elevations.

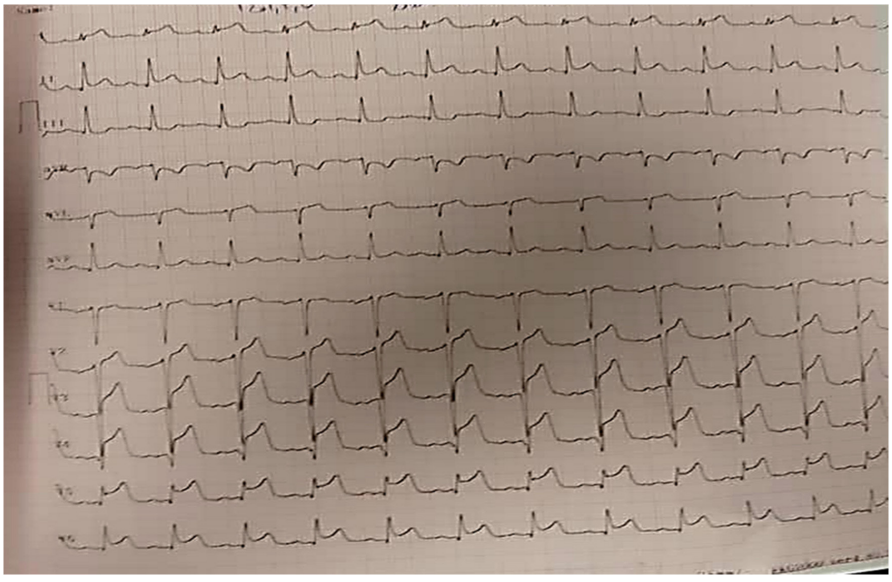

FIGURE 2 Electrocardiogram showing diffused ST-segment elevation, and increased ST elevation in precordial leads.

On the seventh day of admission, the patient's symptoms disappeared gradually. Anticoagulation was switched to rivaroxaban, and the patient was discharged with aspirin 80 mg, clopidogrel 75 mg, and rivaroxaban 15 mg once a day.

During a 1-month follow-up, electrocardiography showed T wave inversion in anterior and lateral leads, ST elevation in inferior leads, and Q wave in lateral leads (Figure 4). CTA revealed reduction of thrombus burden in left anterior descending artery (Figure 5).

Based on clinical status and echocardiographic findings, continuation of rivaroxaban 15 mg daily for 3 months was prescribed.

Additionally, after 3 months, echocardiography detected a reduced-sized LV clot (2.2 cm × 0.7 cm) with an increased LV systolic function (Figure 6).

In addition, the patient had a favorable evolution and showed stable vital signs, pain improvement, no angina, no dyspnea, and good work ability. For the timeline of the events, see Table 1.

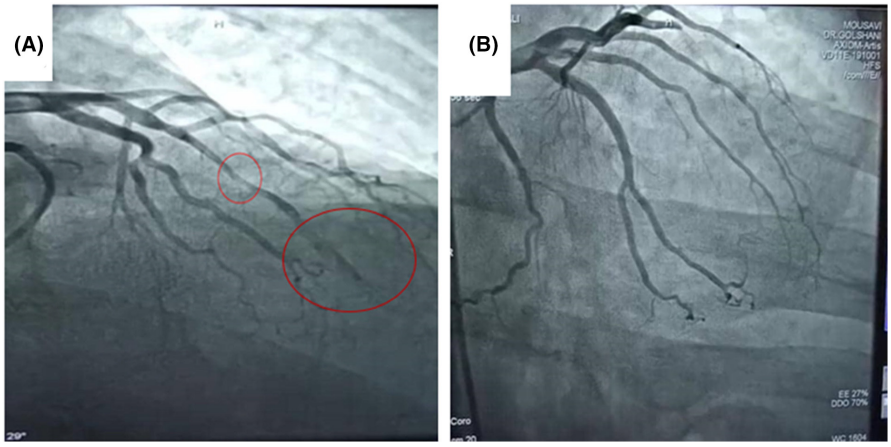

FIGURE 3 (A and B) Angiogram showing nonocclusive and occlusive thrombus in the left anterior descending artery.

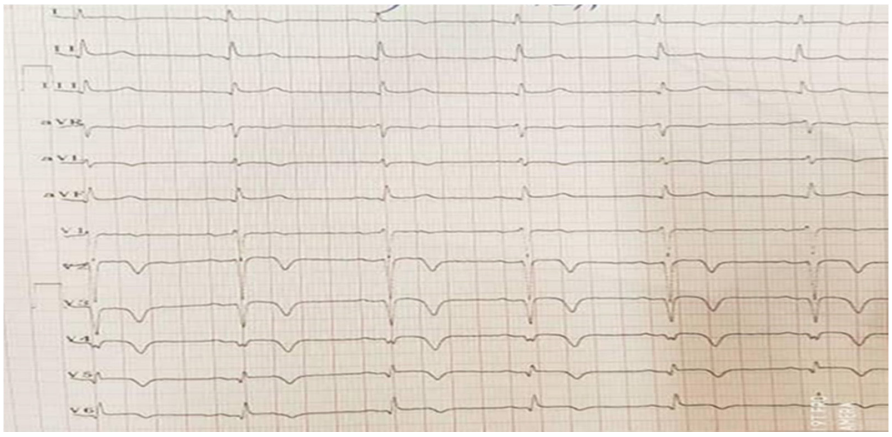

FIGURE 4 Electrocardiogram at 1 month showing T wave inversion in anterior and lateral leads, ST elevation in inferior leads, and Q wave in lateral leads.

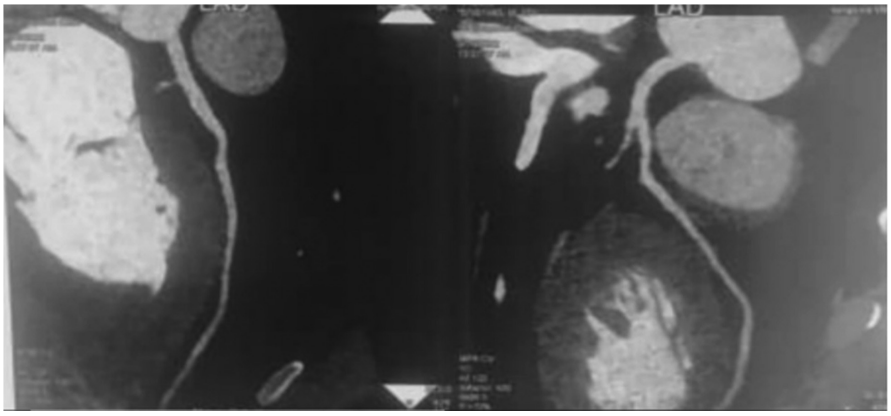

FIGURE 5 Computed tomography angiogram revealed reduction of thrombus burden.

3 | DISCUSSION

The patient in this case report was recovering from COVID-19 infection when he developed acute pericarditis symptoms, elevated cardiac injury biomarkers, and LV clots.

Severe COVID-19 related complications, especially thromboembolic complications can be life-threatening for individuals. Endothelial damage, hemodynamic pathways, and hypercoagulability that result in thromboembolic events intract significantly.[9]

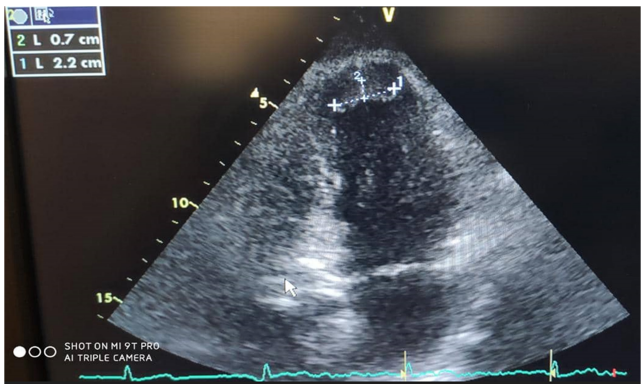

FIGURE 6 Echocardiogram indicating a reduced-sized left ventricular clot (EF = 45%–50%).

Pericarditis is an inflammatory and nonischemic condition that affects the pericardium.[1,10] The clinical appearance varies greatly and may be preceded by coryzal symptoms or generalized symptoms including lethargy, diarrhea, or malaise. Symptomatic arrhythmias, heart failure, myocardial infarction, cardiogenic shock, or sudden cardiac death may be caused by cardiac inflammation.[11] Pleuritic chest discomfort, pericardial friction rub, and suggestive abnormalities in electrocardiography are the clinical hallmarks of acute pericarditis.[4] The most frequent cause is infection, with viral infections being the most frequently recognized in developed nations.[12] Various cardiovascular conditions, such as myocarditis, pericarditis, or more generally, elevated cardiac injury biomarkers, have all been reported as cardiac involvement in COVID-19, according to a growing body of research.[13] Acute coronary syndrome may be caused by localized inflammation at the plaque level, which could destabilize coronary atheroma.[14]

According to a recent systematic review of COVID-19 and pericarditis, patients with COVID-19 pericarditis could be of any age. With a male to female ratio of 2:1, the occurrence is more frequent among men. The most common symptoms reported were fever (51%), shortness of breath (51%), chest discomfort (60%), and myalgia (12%). Fatigue (15%), cough (39%), and diarrhea (12%) were the next most prevalent symptoms.[15] Cardiovascular manifestations and complications following clinical recovery from SARS-CoV2

TABLE 1 Timeline of the events.

Timing	Event
−10 days	History of upper respiratory infections (upper respiratory infection)
Presentation	Pleuritic chest pain, nausea, diarrhea, and cough
+1 day	Pleuritic chest pain Electrocardiography: diffuse ST-segment elevation Echocardiography: reduced ejection fraction (left ventricular ejection fraction: 45%) Serum troponin: within normal limits
+2 day	Increased pleuritic chest pain Positive real-time polymerase chain reaction (RT-PCR) test Electrocardiogram: Increased ST-segment elevation in precordial leads Echocardiography: left ventricle (LV) clot and a decreased EF (35%) Serum troponin (hsTn): 27185 (normal range: 34(Angiography: heavy thrombotic lesion on the left anterior descending artery (LAD)
+1 month	Resolution of chest pain Electrocardiography: T wave inversion in anterior and lateral leads, ST elevation in inferior leads and Q wave in lateral leads Computed tomography angiography (CTA): Reduction of thrombus burden
+3 month	Chest pain relieved Stable vital signs Echocardiography: reduced-sized LV clot EF = 45%–50%

infection are unclear, and few studies have examined long-term COVID-19 patients in detail in an effort to determine the degree to which cardiovascular disturbance contributed to the development of post-recovery symptoms.[16]

Our case demonstrated thrombotic complications such as coronary thrombosis. LV clots can occur even in COVID-19 patients with nonspecific symptoms and gradually progress and lead to clot formation and coronary involvement, which shows the mysterious face of COVID-19.

This complex process indicates the necessity of screening patients for COVID-19 disease even with nonspecific cardiac symptoms.[17]

Moreover, the early initiation of antiviral treatment and most importantly, the initiation of anticoagulants after diagnosis, will stop the progressive course of the disease.

These patients are at risk of cardiac re-thrombosis and cerebral thrombosis. Therefore, it is recommended to continue anticoagulant treatment for at least 3 months.[18]

4 | CONCLUSIONS

Our case demonstrated that thrombotic complications such as coronary thrombosis and LV clots can occur even in well-appearing, COVID-19 patients with nonspecific symptoms which indicates the necessity of screening for COVID-19 disease.

Further studies are also required to analyze the role of routine anticoagulation upon the diagnosis of COVID-19 and preventing further threatening complications.

AUTHOR CONTRIBUTIONS

Jalil Golshani: Resources; supervision. **Zahra Kalantari:** Investigation; resources; writing – original draft; writing – review and editing. **Hassan Ahangar:** Supervision. **Saman Ameri-Mahabadi:** Writing – original draft; writing – review and editing. **Reza Madadi:** Supervision. **Vahid Toupchi Khosroshahi:** Supervision.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

None.

ETHICS STATEMENT

This case report was conducted in accordance with the Declaration of Helsinki. The collection and evaluation of patient health information was performed and reviewed in Zanjan University of Medical Sciences Ethics Committee.

CONSENT

The participant has consented to the submission of the case report to the journal. Written informed consent was obtained from the patient and signed by the patient for publication of all photographs, clinical details and images included herein.

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