CASE REPORT

COVID-19 INFECTION DURING PREGNANCY WITH ACUTE HEART FAILURE, VENOUS THROMBOSIS AND PNEUMONIA

Muhammad Adil Soofi, Muhammad Azam Shah, Olaa Hassan Mhish, Faisal AlSamadi
King Fahad Medical City, Riyadh-Saudi Arabia

The COVID-19 infection has spread rampantly, attaining pandemic status within three months of its first appearance. It has been classically associated with respiratory signs and symptoms. However, unusual presentations have also been reported in multiple literatures. We are reporting a case of acute heart failure in a pregnant patient diagnosed with Covid-19 infection. Her hospital course has been complicated by pneumonia and venous thrombosis during the postpartum period. Her laboratory investigations showed evidence of myocardial injury, acute heart failure, and COVID-19 infection in second PCR sample taken during postpartum period. Echocardiography exhibited features of severe left ventricle systolic dysfunction. She had successful delivery through caesarean-section, nevertheless, her postpartum period was complicated by pneumonia and right femoral venous thrombosis. CT scan of the chest and pulmonary arteries revealed infiltrations in the left lower lobe and right middle lobe, suggestive of consolidation, with no evidence of pulmonary embolism. Cardiac MRI displayed severe global LV and RV systolic dysfunction, but no evidence of myocardial infarction, myocardial infiltration, or abnormal myocardial delayed enhancement. Her condition improved and she was discharged on heart failure medications. During follow-up at the heart failure clinic, her symptoms continued to ameliorate, except the LV and RV systolic dysfunction which persisted. Multiple unusual presentations of Covid-19 infection have been reported in various literatures and screening of the COVID-19 infection should be practiced on regular basis especially among high-risk patients. Prompt identification of COVID-19 infection will lead to proper isolation and mitigation of infection spread among hospitalized patients and health care workers. Covid-19 PCR should be repeated in cases having clinical indication and negative first sample. A proper history and cardiac MRI can differentiate between different aetiologies of heart failure during pregnancy and peripartum COVID-19 infection. Adequate anticoagulation should be considered in COVID-19 patients due to the high risk of thromboembolism. Among patients with COVID-19 infection, CT chest helps demonstrate the extent of pulmonary involvement.

Keywords: Case report; COVID-19; Pregnancy; Acute heart failure

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INTRODUCTION

Respiratory symptoms are the most common presenting complaints associated with Covid-19 infection, and such is the case with pregnant patients as well.[1] However, unusual presentations have also been reported in multiple literatures. We are reporting about a pregnant patient with Covid-19 infection, who developed acute heart failure, venous thrombosis, and pneumonia during her last trimester and early post-partum period.

CASE SUMMARY

A 25-year-old primigravida, of 34 weeks pregnancy, presented to the hospital on April 22, 2020, with progressively deteriorating cough, shortness of breath, and lower limb swelling over the preceding two weeks. Neither was there any exposure to Covid-19 infection, nor was there any history of chest pain, palpitation, and fever prior to the presenting complaints. Foetal ultrasound revealed a single healthy foetus with good movements. Although initial COVID-19 PCR was negative, chest x-ray showed left lower lobe infiltration with opacification of left cardiothoracic angle (Figure-1A). ECG indicated sinus tachycardia, and occasional PVCs (Figure-1D). Echocardiography displayed significant left ventricular (LV) systolic dysfunction, LV ejection fraction of only 15%, mild mitral regurgitation, abnormally dilated LV and left atrium (Figure-2A, 2B). The right ventricle (RV) was slightly enlarged with moderate to severe RV systolic dysfunction and mild tricuspid regurgitation (Figure-2A, 2B). Evidence of cardiac injury was documented by elevated cardiac troponin (cTnI) and B type natriuretic peptide (BNP) (Table-1). Patient was treated as decompensated acute heart failure case and delivered successfully through an uncomplicated caesarean section on April 26, 2020. However, on her first postpartum day, she developed deep vein thrombosis (DVT) in the right superficial femoral

vein (Figure-1C) and was anticoagulated with intravenous heparin. Yet the following day, she complained of pleuritic chest pain with dyspnoea. CT scan of the chest and pulmonary arteries exhibited infiltrations in the left lower lobe and right middle lobe, suggestive of consolidation, with no evidence of pulmonary embolism (Figure-3A, 3B, 3C, 3D). She was continued on diuretics, low dose beta-blocker, and Angiotensin Converting Enzyme Inhibitor (ACEI) for acute heart failure. Broad-spectrum antibiotic (Piperacillin/Tazobactam 4.5 gm IV q6H) was started for hospital-acquired pneumonia and a second PCR for COVID-19 was ordered. Two days after delivery she became febrile and developed worsening chest infiltrates as seen on subsequent chest X-rays (Figure-1B). Her repeat PCR for COVID-19 was positive and the rest of the laboratory workup revealed elevated ferritin, C reactive protein, D-Dimer, and prolactin levels (Table-1). Liver enzymes were initially raised, but improved subsequently (Table-1). Her vital signs remained stable on low oxygen via nasal cannula and supportive treatment. Ultimately, with continued supportive treatment, she became afebrile, chest infiltrates improved on repeat chest X-ray and oxygen saturation remained >94% on room air. She was discharged on beta-blocker, ACEI, diuretic, and anticoagulation. Her Cardiac MRI showed severe global LV and RV systolic dysfunction, but no evidence of myocardial infarction, myocardial infiltration, or abnormal myocardial delayed enhancement (Figure-4A, 4B). She was regularly followed up in the clinic and her dyspnoea improved to NYHA III from IV with optimization of medication, however, LV and RV systolic functions remained persistently reduced on repeat echocardiogram performed after 3 months of presentation (Figure-4C, 4D). She will continue to be followed up at the heart failure clinic.

Table-1: Laboratory investigations

Laboratory	Presentation	Follow-up
Haemoglobin	11 g/dL ↓	14 g/dL
WBC	8.8 10e9/L	
Lymphocyte	15% ↓	
Platelets	148 10e9/L ↓	325 10e9/L
INR	1.3	
D-Dimer	5.11 ug/ml ↑	
ALT	114 u/L ↑	17 u/L
AST	94 u/L ↑	31 u/L
Creatinine	66 mmol/L	
Lactate	1.76 mmol/L	
Cardiac Troponin I	780 ng/L ↑	
B-type Natriuretic Peptide	1114 pg/ml ↑	1500 pg/ml
TSH	1.4 mIU/L	
FT4	16.7 pmol/L	
Ferritin	669 ng/ml ↑	63.6 ng/ml
C Reactive Protein	99.4 mg/L ↑	
Prolactin	332 ng/ml ↑	14.8 ng/ml
ANA, antiDNA	Negative	

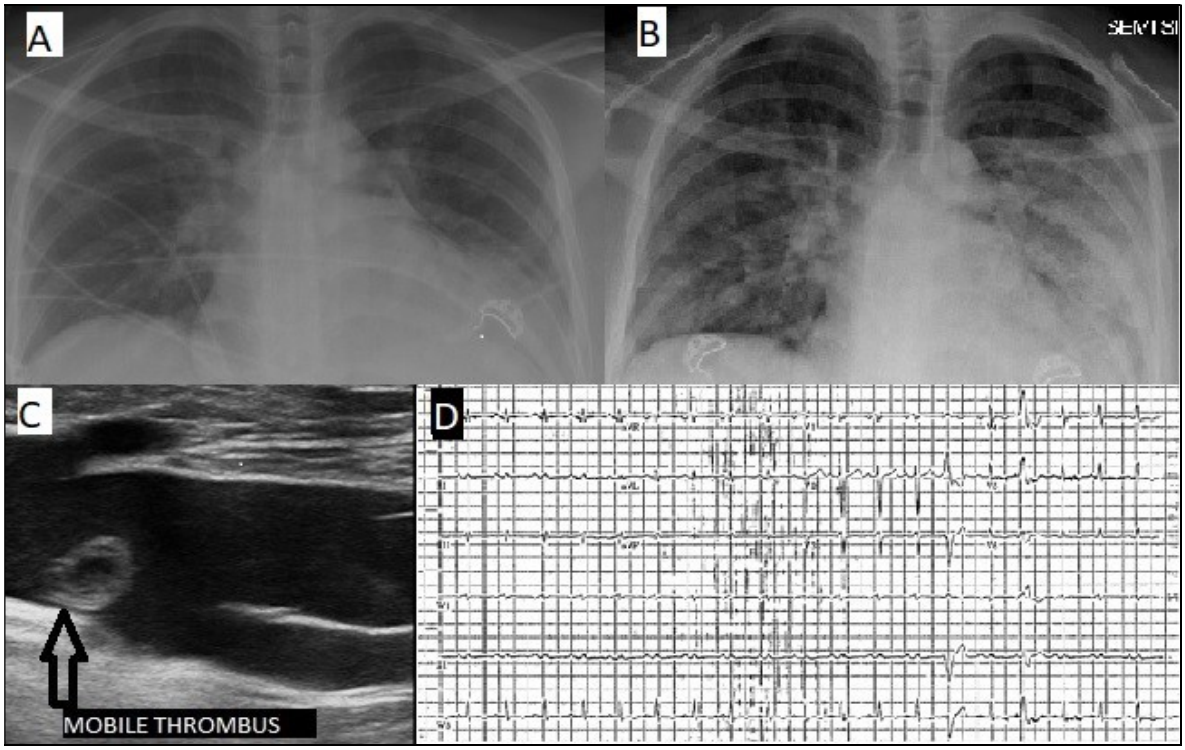

Figure-1: CXR, US Doppler, and ECG. 1A: CXR at presentation, 1B: CXR after 5 days, 1C: US Doppler of right superficial femoral vein showing thrombus, 1D: ECG at presentation showing PVCs.

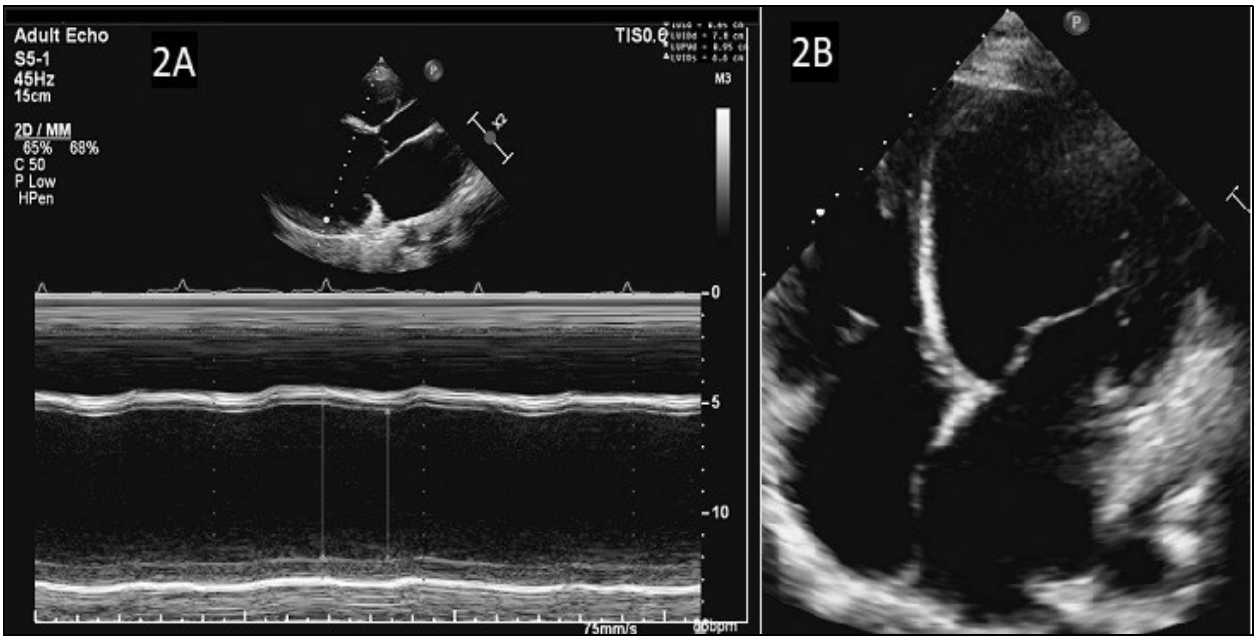

Figure-2: Echo images. 2A: M-Mode of dilated Left ventricle and left atrium and showing severe left ventricle systolic dysfunction, 2B: dilated left ventricle and left atrium in apical 4 chamber view.

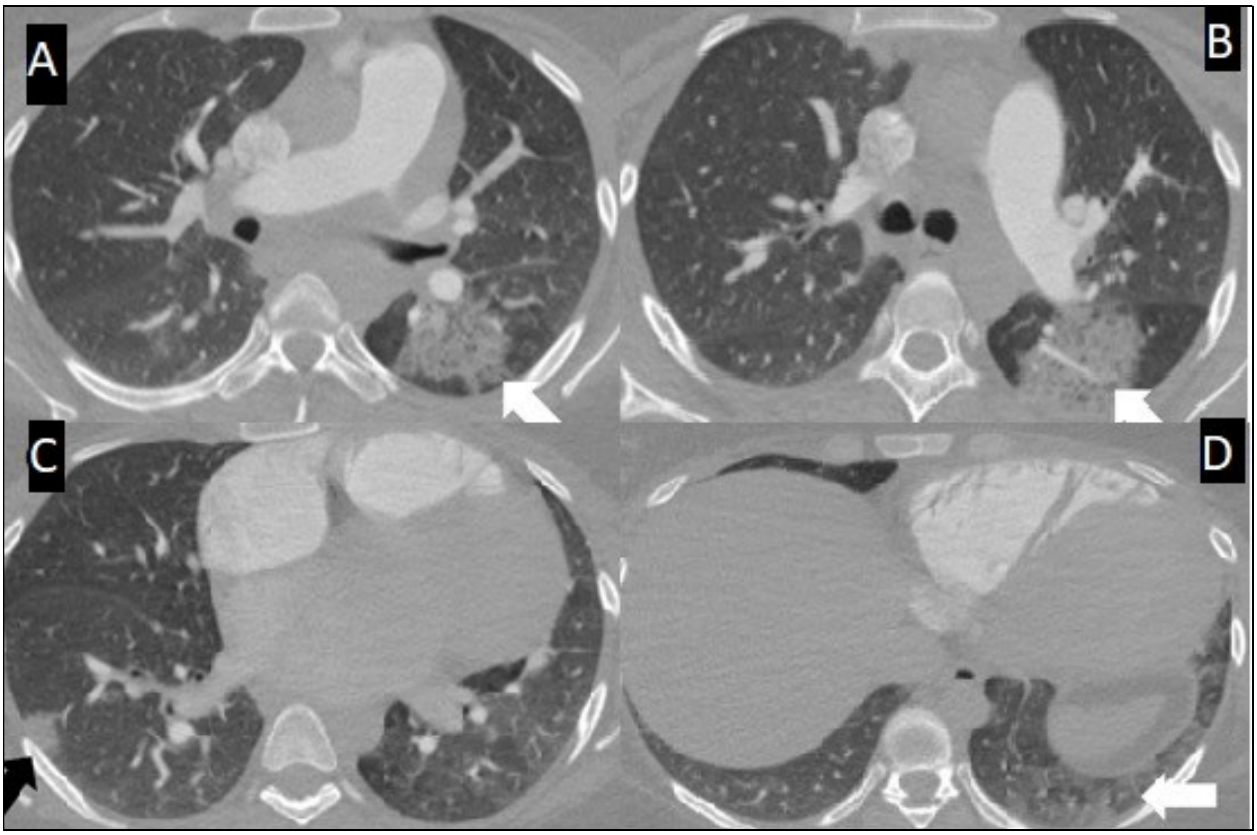

Figure-3: CT scan of the chest. 3A: Left lower lobe consolidation (white arrow), 3B: Left lower lobe consolidation (white arrow), 3C: Right middle lobe consolidation (black arrow), 3D: Left lower lobe consolidation (white arrow).

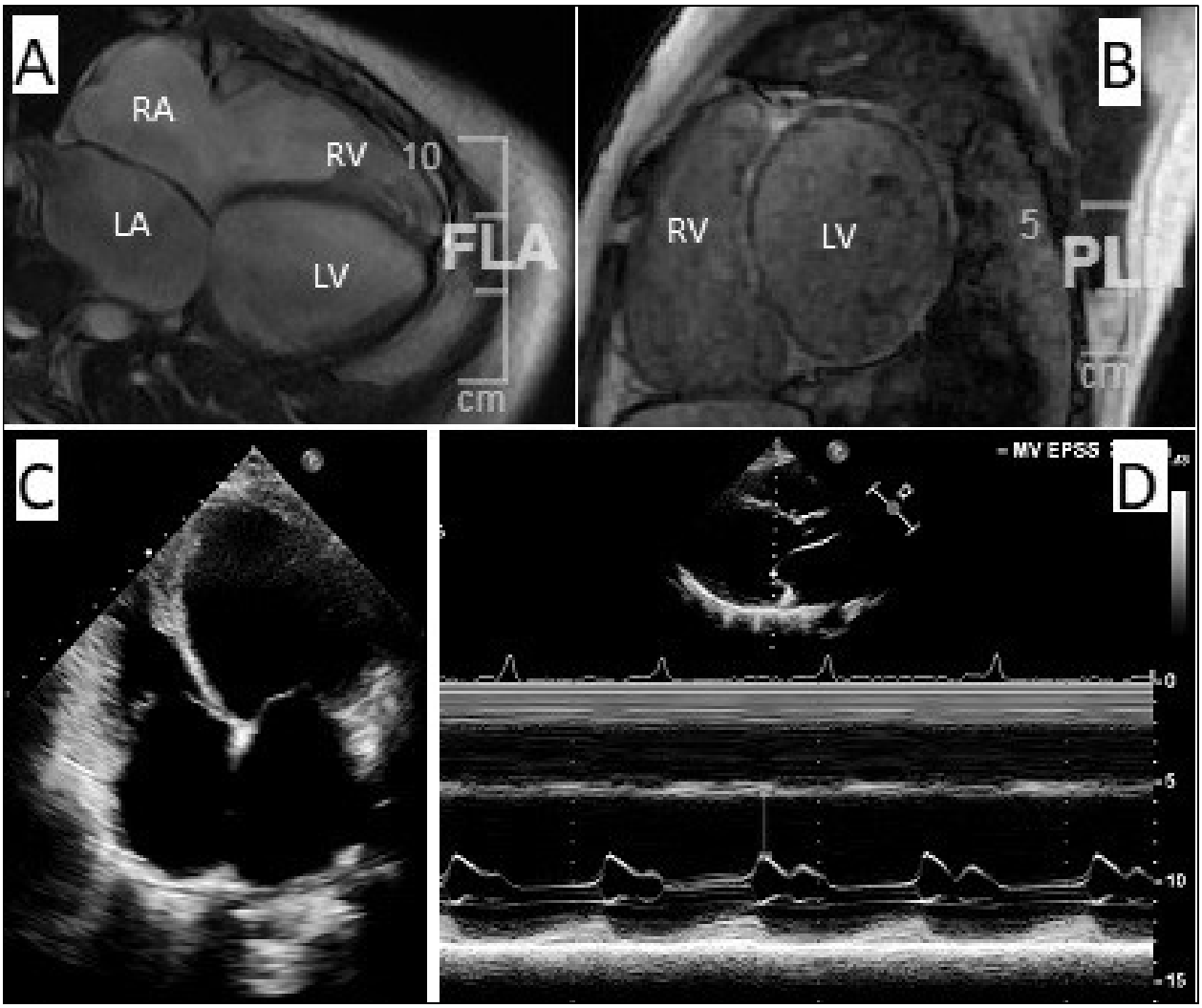

Figure-4: Cardiac MRI and repeat echocardiogram. 4A: Cardiac MRI showing four dilated chambers. 4B: cardiac MRI showing a cross-sectional view of dilated LV and RV. 4C: Repeat echocardiogram showing dilated cardiac chambers. 4D: Repeat echocardiogram M-Mode showing dilated LV and RV.

DISCUSSION

In December 2019, the Wuhan region of China saw a spike of unusual COVID-19 infection-related pneumonia cases, which, while raised alarms forcing local containment measures, spread rampantly across all continents, hence being declared a pandemic by the World Health Organization within merely three months on March 11, 2020.[2]

We presented a gestational COVID-19 infection case, associated with cardiomyopathy and thromboembolism; our pregnant patient developed acute heart failure during her last trimester, followed by DVT and pneumonia in her early post-partum period. Pregnancy is an immunocompromised state, predisposing women to higher risk of COVID-19 infection than their non-pregnant counterparts.[3] The presentation of Covid-19 infection among pregnant women has been no different than the usual in one case series.[1] Coronavirus during early pregnancy has been associated with maternal and foetal morbidity and mortality[4], though in case of our patient, foetal condition remained stable throughout, while maternal morbidity responded to supportive treatment. Most of such infected pregnant patients have undergone caesarean sections.[1] Still, normal vaginal deliveries of healthy babies have also been reported in studies.[5] Up till now, there has been no recommendation of any specific treatment for COVID-19 infection among pregnant patients. In keeping with these research findings, our patient also underwent caesarean section and was treated with supportive management. Studies have also evaluated Vertical transmission risk of COVID-19 from pregnant mothers to their foetus, but no evidence of such risk has been detected thus far.[3] The sensitivity of COVID-19 PCR test is 70%

and chances of false-negative result are 30%.[6] Thus, our pregnant patient's first throat and nasal swab Covid-19 PCR test's negative result was most likely a false negative, as she had definitive radiological evidence of pulmonary consolidation at that time, along with the fact that her second Covid-19 PCR test conducted 5 days later yielded positive result. Repeat PCR testing has been recommended for clinically symptomatic patients if the first PCR test is negative.[7]

The patient had Cardiac injury, as suggested by her increased cardiac troponin and natriuretic peptide levels, in addition to inflammation indicated by raised ferritin, CRP, and D-Dimer levels (Table-1). Acute myocarditis, heart failure, and cardiac injury have been reported with Covid-19 infection and are associated with high mortality.[8,9] Advanced age and multiple comorbidities are considered risk factors for Cardiac injury and 20% of patients presenting with Covid-19 infection have evidence of such cardiac injury.[8] Elevated liver transaminase in our patient upon presentation was likely due to viral infection, which improved during follow-up. Heart failure has been reported among 23% of patients with COVID-19 infection.[9] In fact, three stages of COVID-19 infection have been described[10]; Stage I is the viremia phase with flu-like symptoms and fever as the major manifestations, stage II has pulmonary involvement with hypoxia as the major feature, and stage III is the stage of inflammation and cytokine release syndrome.[10] Heart failure is expected at stage III[10], yet in our case, heart failure was the presenting complaint. The possible causes of acute heart failure during pregnancy in our patient could have been peripartum cardiomyopathy with COVID-19 infection, dilated cardiomyopathy decompensated during the last trimester with COVID-19 infection, or acute heart failure due to COVID-19 infection. Thus, it can often be challenging to differentiate between such similarly presenting aetiologies. Nevertheless, a detailed history and cardiac MRI can help confirm the diagnosis. Peripartum cardiomyopathy is defined as systolic dysfunction of the left ventricle with heart failure occurring during the last month of pregnancy or first 6 months postpartum.[11] Studies have shown that delayed gadolinium enhancement in cardiac MRI is absent in 62% of the patients with peripartum cardiomyopathy and 59% of patients with dilated cardiomyopathy.[11,12] On the other hand, cardiac MRI has been abnormal in 78% of patients with COVID-19 induced cardiomyopathy.[13] Our patient developed heart failure in the last month of pregnancy and her cardiac MRI did not show any delayed gadolinium enhancement; based upon this history and cardiac MRI finding, our patient most likely had peripartum cardiomyopathy with COVID-19 infection.

Venous thromboembolism and pulmonary embolism have been reported with COVID-19 infection and are associated with high mortality.[14] Earlier research has reported higher risk of thromboembolism among COVID-19 infected pregnant and postpartum females having had caesarean section.[3] Anticoagulation is recommended for such cases with COVID-19 infection[14] due to an increased risk of thromboembolism. Our patient developed DVT on the first postpartum day and was anticoagulated with intravenous heparin.

Fever, a typical symptom of infection, was not detected in this patient, yet a CT scan of her chest uncovered consolidations involving the left lower lobe and right middle lobe. The sensitivity of CT chest imaging for detecting COVID-19 infection has been variable and dependent upon the prevalence of COVID-19 infection in the community.[15] Nonetheless, CT chest is a useful imaging tool to demonstrate the extent of infection which may have remained obscured in chest X-ray. Bilateral peripheral ground glass and consolidative opacities on CT chest are typical of COVID-19 chest infection.[15]

CONCLUSION

Acute heart failure is a recognized complication of COVID-19 infection. COVID-19 should be suspected among pregnant and postpartum patients who develop acute heart failure or features of thromboembolism. COVID-19 PCR should be repeated in clinically suspected patients if the first sample is negative. Detailed history plus cardiac MRI together helps distinguish between the various aetiologies of cardiomyopathy, especially in cases of ambiguity where heart failure and COVID-19 infection are diagnosed during peripartum period. Adequate anticoagulation should be considered for COVID-19 patients due to the high risk of thromboembolism. CT scan of the chest can help confirm pulmonary involvement if not evident on chest X-ray.

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Address for Correspondence:

Dr. Muhammad Adil Soofi, Dabab street, Sulaimaniya, PO Box 221124, Zip code 11311, Riyadh-Saudi Arabia
Tel: +966539417270
Email: adilsoofi@hotmail.com