

## Unexplained Acute Right Ventricular Dilatation and Dysfunction in COVID-19

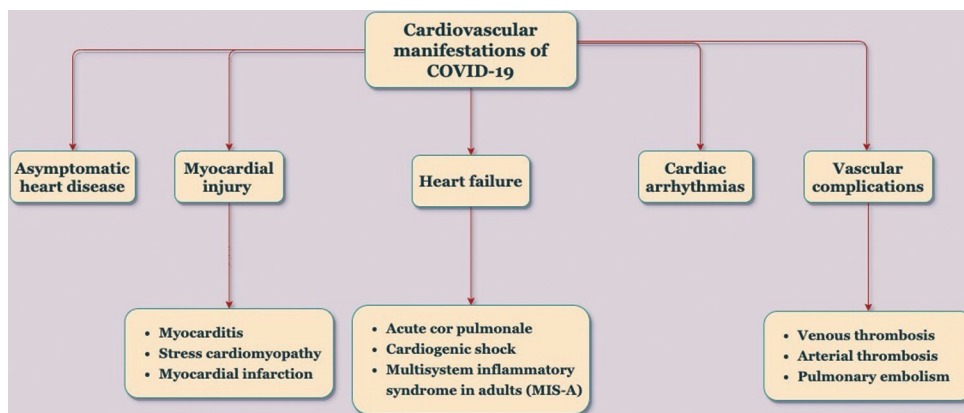
Sir,

COVID-19 has a wide range of clinical presentations. The differential diagnosis of obstructive shock in patients with COVID-19 includes acute pulmonary embolism and acute cor pulmonale.

A 39-year-old nonsmoker male with no known comorbidities was tested to be COVID positive by RT-PCR 5 days after a contact history. He had an uneventful course with no hypoxia till day 18, when he developed sudden-onset breathlessness and presented to the emergency department. Electrocardiography showed sinus tachycardia with S1Q3T3 pattern. Point-of-care ultrasound (POCUS) revealed gross dilatation of the right atrium and ventricle with D-shaped left ventricle and bilateral B-profile; deep venous thrombosis screening of bilateral lower limbs revealed no thrombus. Computed tomography pulmonary angiogram revealed no pulmonary embolus. He had refractory hypotension and succumbed to his illness on day 3 of admission.

The various cardiovascular manifestations of COVID-19 can be broadly categorized into asymptomatic heart disease, myocardial injury, heart failure, cardiac arrhythmias, and vascular complications [Figure 1].<sup>[1-3]</sup>

The right ventricle (RV) has been called the forgotten chamber historically. However, the importance of RV is increasingly being recognized. The COVID pandemic has further highlighted the importance of RV. The two major life-threatening causes for acute RV dysfunction in COVID-19 are acute pulmonary embolism and acute cor pulmonale. Acute pulmonary embolism is well-recognized; however, acute cor pulmonale is not well-recognized and is poorly understood. The proposed mechanisms for acute right ventricular dilatation and dysfunction in COVID-19 include hypoxemic vasoconstriction from acute respiratory distress syndrome (ARDS), negative inotropic effects of cytokines, and direct effects of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on the right ventricle, through



**Figure 1:** Cardiovascular manifestations of COVID-19

angiotensin-converting enzyme 2 (ACE2) mediated binding. In a study of 100 hospitalized patients, RV dilatation was the most common echocardiographic abnormality observed in COVID-19, and was the only echocardiographic finding significantly associated with mortality.<sup>[4,5]</sup>

The diagnosis of acute cor pulmonale is based on bedside echocardiographic findings in such patients, implying the utility of point-of-care ultrasound (POCUS) performed by emergency physicians. Since the presence of acute cor pulmonale in COVID-19 patients has increased the risk of cardiac arrest and mortality, early recognition and its treatment may result in decreased mortality and improved patient outcomes.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given his consent for images and other clinical information to be reported in the journal. The guardian understands that names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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## REFERENCES

1. Nishiga M, Wang DW, Han Y, Lewis DB, Wu JC. COVID-19 and cardiovascular disease: From basic mechanisms to clinical perspectives. *Nat Rev Cardiol.* 2020;17:543–58.
2. Shafi AMA, Shaikh SA, Shirke MM, Iddawela S, Harky A. Cardiac manifestations in COVID-19 patients—A systematic review. *J Card Surg.* 2020;35:1988–2008.
3. Creel-Bulos C, Hockstein M, Amin N, Melhem S, Truong A, Sharifpour M. Acute Cor Pulmonale in Critically Ill Patients with Covid-19. *N Engl J Med.* 2020;382:e70.
4. Szekeley Y, Lichter Y, Taieb P, Banai A, Hochstadt A, Merdler I, *et al.* Spectrum of Cardiac Manifestations in COVID-19: A Systematic Echocardiographic Study. *Circulation.* 2020;142:342–53.
5. Argulian E, Sud K, Vogel B, Bohra C, Garg VP, Talebi S, *et al.* Right Ventricular Dilatation in Hospitalized Patients With COVID-19 Infection. *JACC Cardiovasc Imaging.* 2020;13:2459–61.

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