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CASE REPORT

Cardiology

Unexpected finding of myocardial depression in 2 healthy young patients with COVID-19 pneumonia: possible support for COVID-19-related myocarditis

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Abstract

COVID-19 is proving to be a devastating pandemic with both tragic economic and health consequences worldwide. Point-of-care ultrasound (POCUS) of the lungs has been thrust into the forefront of resources that could be used in the management of COVID-19 acute care patients. However, relatively little attention has been paid to POCUS utility in assessing the heart in COVID-19 patients. Anecdotal reports suggest encounters of likely COVID-19 induced pericardial effusions and myocardial electrical dysfunction. This article presents 2 cases of generally healthy patients who were noted to have classic COVID-19 bilateral pneumonia findings on lung ultrasound and incidentally discovered to have unsuspected left ventricular dysfunction likely resulting from myocarditis. POCUS videos are presented as illustrations of this potentially overlooked complication.

KEYWORDS
COVID-19, point-of-care ultrasound, emergency medicine, myocarditis, COVID-19 pneumonia

1 | INTRODUCTION

COVID-19 is making an unprecedented impact around the world, impacting the global economy, leading to tens of thousands of deaths and stressing medical systems in multiple countries.[1] Concerns regarding ventilator shortages have potentially exacerbated the focus on pulmonary aspects of the disease, resulting in a relative lack of information and reporting about other significant clinical manifestations.[1] The images of infiltrated lungs on chest computed tomography (CT) scans paint an impactful picture of the physiologic burden that has led to so many deaths.[2]

Although chest x-rays have continued to show limited use and are driving the early use of chest CT in COVID-19 patients, there has also been widespread recognition that lung point-of-care ultrasound (POCUS) is highly accurate for pneumonia diagnosis and monitoring, as well as other settings outside of COVID-19, without the high cost and radiation exposure encountered with chest CT.[3,4] Radiological societies have recommended not using chest CT and have openly stated lung ultrasound should be performed preferentially in potential COVID-19 patients.[5] Decontamination of an ultrasound machine requires simple wiping, as opposed to a CT scanner, which is a significant process that can bring down badly needed scanners for an hour at a time, impacting other patients in the health system. Additionally, patient transportation increases healthcare provider exposures.

However, in addition to lung involvement, there are increasing anecdotal reports regarding pericardial effusions and electrical

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conduction abnormalities encountered in COVID-19 patients. Presented are 2 cases of unexpected abnormal cardiac contractility found in previously healthy, newly presenting COVID-19 bilateral pneumonia patients.

2 | CASE 1

A 46-year-old male with a history of well-controlled hypertension presented to the emergency department (ED) with 1 week of increasing cough, generalized aches, and malaise. The patient had never smoked and had no other medical conditions or pulmonary diseases. At triage, while on the EMS stretcher, the patient suddenly became diaphoretic and unresponsive with tonic-clinic jerking lasting <5 seconds. He woke up rapidly on being reclined from his sitting position and had no post ictal period. Blood pressure was noted to be 120/83 mm Hg, respiratory rate = 24, oxygen saturation was 90% on room air; temperature was 38.4°C orally. A rapid POCUS assessment was performed showing no free intra-abdominal fluid, normal appearing inferior vena cava collapsing 25% with normal respiratory effort, and no pleural effusions. However, bilateral pleural abnormalities were found associated with scattered sub-pleural consolidations and comet tail artifacts in a distribution consistent with typical lung ultrasound findings in COVID-19 pneumonia (Video 1).[4]

The patient was given 500 mL intravenous normal saline bolus and did not require further fluid blousing or administration in the ED.

The emergency physician also assessed the patient's heart and noted decreased left ventricular contractility without pericardial effusion. His ejection fraction was visually assessed to be mildly to moderately depressed—approximately in the 40%–45% range from multiple views (Video 2). The patient had high medical literacy and related optimal blood pressure control for nearly 20 years, and prior (12 months previously) echocardiography examination showing normal cardiac function at a different facility. His ECG showed tachycardia and diffuse non-specific ST wave abnormalities. Blood work revealed normal cardiac enzymes, WBC of 12,500/mm^3, and normal comprehensive metabolic profile and lactic acid. The patient was admitted to the hospital for supportive therapy and antibiotic administration. His nasal swab returned positive for COVID-19. Cardiology was consulted during this stay and a follow-up echo at 1 week showed a slightly improved ejection fraction at 50%. Repeat cardiac markers showed a transient mild elevation in the troponin I. The patient had no ectopy or arrhythmias reported during his stay. He did not require anti-arrhythmics. The patient was felt to have likely suffered a vasovagal syncope and have myocarditis. Follow-up echo was scheduled for 6 weeks.

3 | CASE 2

A 21-year-old male with no medical history and 3-pack-a-year smoking history presented to the ED after being sent from work as a fast food counter clerk for "coughing too much and a fever." He noted that he had recently been told to monitor his blood pressure. He reported aches, chills, and cough for ~7 days and 2 days of diarrhea that resolved 3 days prior to ED arrival. His temperature was 38.6°C, respiratory rate = 25, heart rate 136, blood pressure of 195/103 mm Hg, and oxygen saturation was 88% on room air. He was diaphoretic, appeared uncomfortable, and noted that "Things he ate did not taste much." He denied any contact with COVID-19 patients or exposures.

A POCUS lung and cardiac examination was performed. Lung ultrasound showed multiple bilateral lesions with irregular, thickened pleura with associated discontinuities and sub-pleural consolidations (Video 3). These findings were felt to be in keeping with COVID-19 bilateral pneumonia reported around the world.[4] The patient's heart was evaluated to rule out a pericardial effusion. No pericardial effusion was noted, but the patient's left ventricular ejection fraction was moderately to severely depressed with an approximate ejection fraction in the range of 25%–30% from multiple views (Video 4). This was surprising given his age, lack of history, and fever. Laboratory values showed an elevated WBC to 14,400/mm^3, a mildly elevated troponin I to 0.14 ng/mL (upper normal range of 0.08 ng/mL), brain natriuretic peptide was mildly elevated at 468 pg/nL (upper normal range of 200 pg/nL), the patient's alanine aminotransferase was mildly elevated but the remaining blood work was within normal limits. The patient's ECG showed tachycardia and nonspecific ST wave changes in the lateral leads (Figure 1). The patient was admitted to the hospital for supportive therapy and antibiotic administration of azithromycin and hydroxychloroquine. He did not require intubation or pressors. His nasal swab returned positive for COVID-19. The patient was eventually discharged home after 1 week with a cardiology follow-up.

4 | DISCUSSION

Although much attention has been focused on the pulmonary manifestations of COVID-19 and its devastating impact on patients, there is emerging evidence that COVID-19 may also have cardiac effects as well, ones not typically seen with other common viruses. Recent anecdotal reports have suggested unexpected pericardial effusion and electrical myocardial dysfunction. A recent published case suggested the development of Brugada syndrome in COVID-19 patients.[6] To date, there were no identifiable published reports of POCUS-identified myocardial depression in otherwise healthy COVID-19 patients, such as could be expected with myocarditis.

Viral myocarditis incidence worldwide is thought to be between 10 and 22 cases per 100,000 people.[7] Myocarditis appears to have a predilection for young and middle-age adults, and the median age at diagnosis is 42.[8] The leading viral causes are coxsackie and parvovirus B19 viruses in Europe and the United States. The World Health Organization describes viral myocarditis as an inflammatory disease of the myocardium, but one that is non-ischemic.[9] Nearly 72% of viral myocarditis patients present with shortness of breath, a symptom lost in the current COVID-19 epidemic with many presenting patients complaining of dyspnea.[10] Establishing the diagnosis can be challenging, especially when patients may have comorbidities such as cardiomyopathy of cardiac ischemia. Up to 59% can have non-specific ST abnormalities, and nearly 11% show a bundle branch block.[11] Patients

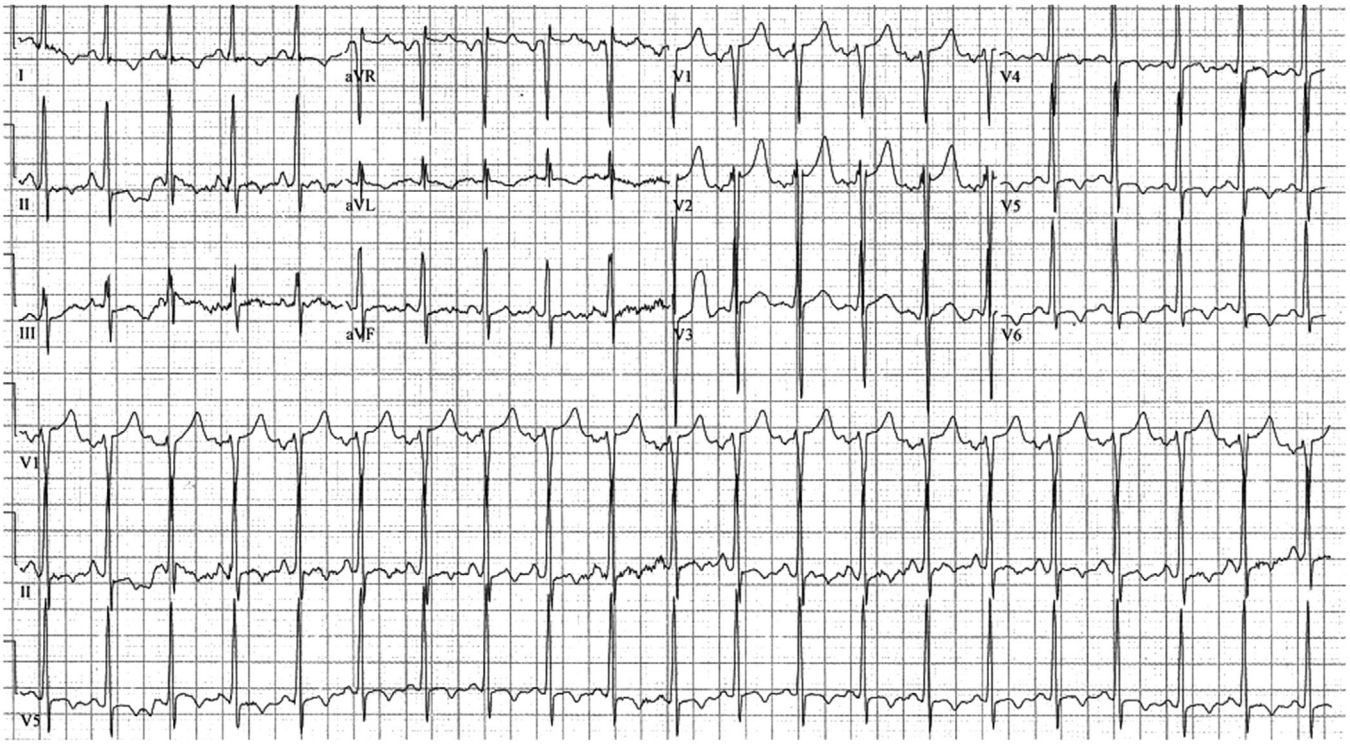

FIGURE 1 ECG from Case 2 showing sinus tachycardia and lateral T wave abnormalities

presenting with mild left ventricular dysfunction in the range of 40%–50% are most likely to recover completely. Those with left ventricular ejection fraction of 35% and below stand a 50% progressing to chronic left ventricular dysfunction.[12]

A report posted by the American College of Cardiology on their website discusses 2 case reports from a cardiologist in China consulting on 2 patients with unexpected depressed myocardial function.[13] Neither showed viral infiltration in the myocardium on biopsy, but both were COVID-19-positive.[13] The cardiologist felt both cases were COVID-19-related myocarditis.[13] As seen in Case 2 above, with more severe myocardial depression, troponins were mildly elevated.

These cases serve to raise the awareness of emergency physicians and others treating COVID-19 patients to consider evaluating the heart with POCUS, not just for pericardial effusion but also for left ventricular systolic function on a more routine basis. Considering that a POCUS cardiac evaluation is reasonable for most patients presenting to the ED with dyspnea, it should be considered in most COVID-19 patients who are also undergoing lung ultrasound. Additionally, with the COVID-19 patient population skewed toward the elderly and those with comorbidities, a focused evaluation of the heart appears prudent.

CONFLICTS OF INTEREST

MB is a consultant with EchoNous Inc, 410Medical, Ethos Medical and Sonosim Inc. These companies had no influence or contribution to this manuscript, nor knowledge of its creation.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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