

Editorial



Critical Role of Cardiopulmonary Point-of-Care Ultrasound in the Era of COVID-19

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Conflict of Interest

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In the era of coronavirus disease 2019 (COVID-19), limited utilization of medical facilities is one of the big issues in clinical practice. However, patients with suspected COVID-19 pneumonia should be evaluated systemically not just for lung, but also for cardiac involvement.^{1,2)} The usual approach to patients with acute respiratory symptoms is chest X-ray and computed tomography (CT) scans, in accordance with blood biomarker studies. In addition, to differentiate cardiac origin of dyspnea, echocardiography is widely used in combination with electrocardiography and blood biomarkers. However, in the COVID-19 pandemic, sanitization is crucial after chest X-ray, CT, or echocardiography examination in suspected COVID-19 infection. This requires much more human and economic resources and raises the needs for rapid, portable but reliable bedside equipment for cardiopulmonary evaluation. Point-of-care ultrasound (PCOUS) including echocardiography and lung ultrasound (LUS) fits this purpose for use in the emergency room, intensive care unit (ICU), and outside the hospital, especially in patients on a mechanical ventilator. LUS is superior to supine portable chest X-ray for rapid evaluation of pneumothorax, alveolar interstitial pattern, consolidation, and pleural effusion. In addition, it has the advantages of immediate bedside availability, repeatability, cost saving, and reduction in radiation exposure.

The paper by Bitar et al.³⁾ in this issue noted the usefulness of POCUS (Echo and LUS) to differentiate severe acute respiratory syndrome coronavirus 2 infection in patients with acute respiratory distress symptoms in the ICU. In the study, bedside echocardiography was useful to differentiate cardiac origin of dyspnea by lower E/e' and absence of inferior vena cava plethora. In addition, right ventricular thrombus, pulmonary embolism, and right ventricular dysfunction, which are sometimes combined in COVID-19 pneumonia, can be detected by POCUS with echocardiography. The most important finding in this study is that typical patterns of LUS were significantly correlated to confirmative diagnosis of COVID-19 pneumonia. The LUS revealed four signs suggestive of COVID-19 pneumonia in 77 patients (98.6%) (sensitivity, 96.9%; 85% confidence interval, 99.5%) compared with reverse transcription-polymerase chain reaction results. The aeration score was significantly higher for COVID-19 pneumonia ($p = 0.018$), as was the total number of subpleural consolidations in the 12 zones of the chest ($p < 0.0001$). This finding is consistent with previous studies of COVID-19.^{3,4)} According to recommendation for LUS from the European Association of Echocardiography and American Society of Echocardiography, there are specific patterns for COVID-19 pneumonia, as shown in the **Table 1**.⁵⁾ However, in clinical situations, as disease symptoms can overlap, patient care should be based on “Point-of-Care Ultrasound” as well as

Table 1. Typical signs of COVID-19 and aeration score on lung ultrasound**The 4 signs of COVID-19 pneumonia on lung ultrasound⁹⁾**

1. Bilateral B-lines in both separate and coalescent forms, sometimes patchy, frequently giving the appearance of a shining white lung. The B lines maintain their brightness to the end of the screen.
2. Bilateral diffuse irregularities of the pleural line.
3. Absence of significant pleural effusion.
4. Presence of multiple subpleural consolidations of various sizes.

COVID-19: coronavirus disease 2019.

“Point-of-Care Integration.” Based on the likelihood of another viral pandemic or epidemic at some point in the future, physicians involved in patient care of infectious disease, cardiac diseases, or respiratory diseases in a critical care unit or emergency department should become experts in POCUS with LUS and echocardiography.

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