



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

A Brief Review of Lung Ultrasonography in COVID-19: Is It Useful?

To the Editor:

The novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-Cov2), is known to cause mild to severe lower respiratory disease (coronavirus disease 2019 [COVID-19]) that extends bilaterally with basal and peripheral involvement of the lung.¹ Computed tomography (CT) has been the most widely recommended and used imaging modality for screening thus far²; however, it has significant downsides, including the need for extensive sterilization of equipment after use with highly contagious COVID-19 virus, along with cost and excessive radiation. Lung ultrasonography has been previously established as an excellent method of diagnosing and monitoring pneumonia and acute respiratory distress syndrome, particularly when compared with chest radiograph,^{3,4} and thus has potential as an inexpensive and effective imaging modality in the early diagnosis and monitoring of patients with COVID-19.

The literature of lung ultrasonography in COVID-19 patients is scarce but promising. Huang et al⁵ showed in a small preliminary study that 75% of observed patients with COVID-19 had identifiable lesions in the bilateral lower lobes. This study examined 20 patients with noncritical illness, using a 3 to 17-MHz high-frequency linear array to characterize lung lesions, and found a few identifying characteristics: numerous bilateral B lines, subpleural pulmonary consolidations, and poor blood flow. These findings were highly consistent with findings on CT. In addition, they determined that COVID-19 subpleural lesions differed significantly from similar ones observed in bacterial pneumonia, pulmonary abscess, tuberculosis, atelectasis, and cardiogenic pulmonary edema,⁵ an example of which is that B lines in COVID-19 appear to be more fixed, fused, and obtuse compared with those in cardiogenic pulmonary edema.⁵ Peng et al⁶ also examined 20 patients with COVID-19, using lung ultrasonography, and described similar characteristic findings that typically appeared in a multilobar distribution: focal B lines were the main early feature, followed by alveolar interstitial syndrome in progressive stages, and then A lines during convalescence. Pleural effusions were rarely observed at any stage. A third preliminary study performed by Poggiali et al,⁷ using ultrasonography and CT, evaluated 12 patients who presented with symptomatic COVID-19. They reported good consistency between B lines on ultrasonography and ground-glass opacities on CT in all 12 patients, with both modalities identifying organizing pneumonia in 4 of them.

As observed with the early clinical evidence, lung ultrasonography in COVID-19 patients was able to identify characteristic lesions that were highly consistent with findings on CT. Although CT is still considered the preferred imaging modality, ultrasonography may be useful in evaluating for early lung changes in emergency department patients with suspected COVID-19 or in monitoring progression of confirmed cases. In resource-limited settings, ultrasonography could theoretically be applied as a triaging tool in which patients with identified lesions are prioritized for CT imaging, with the hope of reducing the number of contagious patients entering the scanner. There is still an obvious need for more clinical evidence before definitive conclusions can be made; however, that should not stop clinicians from using ultrasonography early during this pandemic.

Matthew J. Fiala, MD
Transitional Residency Program
John Peter Smith Hospital
Fort Worth, TX

<https://doi.org/10.1016/j.annemergmed.2020.03.033>

Funding and support: By *Annals* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The author has stated that no such relationships exist.

1. Kanne P, Little B, Chung J, et al. Essentials for radiologists on COVID-19: an update—Radiology Scientific Expert Panel. Available at: <https://doi.org/10.1148/radiol.2020200527>. Accessed March 20, 2020.
2. National Health Commission of the People's Republic of China. Diagnosis and treatment of novel coronavirus pneumonia (trial, the fifth version). Available at: <http://www.nhc.gov.cn/yzygj/s7653p/202002/3b09b894ac9b4204a79db5b8912d4440.shtml>.
3. Mayo PH, Copetti R, Feller-Kopman D, et al. Thoracic ultrasonography: a narrative review. *Intensive Care Med*. 2019;45:1200-1211.
4. Pagano A, Numis FG, Visone G, et al. Lung ultrasound for diagnosis of pneumonia in emergency department. *Intern Emerg Med*. 2015;10:851-854.
5. Huang Y, Wang S, Liu Y, et al. A preliminary study on the ultrasonic manifestations of peripulmonary lesions of non-critical novel coronavirus pneumonia (COVID-19) (February 26, 2020). Available at: <https://doi.org/10.2139/ssrn.3544750>. Accessed March 20, 2020.
6. Peng Q, Wang X, Zhang L. Findings of lung ultrasonography of novel corona virus pneumonia during the 2019-2020 epidemic. *Intensive Care Med*. <https://doi.org/10.1007/s00134-020-05996-6>.
7. Poggiali E, Dacrema A, Bastoni D, et al. Can lung US help critical care clinicians in the early diagnosis of novel coronavirus (COVID-19) pneumonia? *Radiology*. <https://doi.org/10.1148/radiol.2020200847>.