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.

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Visual Case Discussion

A case of lung ultrasound findings in a 73-year-old male with COVID-19

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1. Discussion

COVID-19, the clinical syndrome caused by infection with the 2019 novel coronavirus SARS-CoV-2, has presented immense challenges globally to society, healthcare systems and to emergency departments (EDs). Specifically, to emergency providers, the possibility of infection poses a significant risk, raising concerns as to the use of stethoscopes in diagnosis. Additionally, traditional Chest X-Ray and Chest Computed Tomography (CT) pose the challenges of device and equipment contamination and nosocomial spread of the virus to uninfected patients in the ED and hospital. The COVID-19 pandemic has further demonstrated the opportunity for the use of point of care ultrasound (US) as a rapid, portable modality for clinical diagnosis and decision making. In addition to well-known diagnostic utility in evaluating the lungs[1], US technology also has advantages of being easier to clean and keeping the potentially infective patient in isolation to prevent nosocomial transmission and limiting exposure to multiple health care workers.[3]

2. Visual case discussion

This case involves a 73-year-old male with a history of hyperlipidemia who presented to the ED with epigastric and generalized abdominal pain with associated nausea. He denied shortness of breath, cough, or chest pain. The patient appeared comfortable, febrile to 39.1°, but with BP, HR and RR within the normal range, and reassuring oxygen saturations of 96% both resting and with exertion. Lung exam was normal, abdominal exam was benign, and the rest of the physical exam was unremarkable. He was discharged with close follow-up and return precautions, including follow-up phone calls, and returned to the ED two days later. This time, he was notably tachypneic, complaining of cough and shortness of breath, and hypoxic to 90% resting and 87% with exertion. He was admitted to a step-down unit, tested positive for COVID-19 via nasopharyngeal PCR.

The patient's initial presentation was notable for a lack of specific respiratory or thoracic complaints, as well as unremarkable initial exam and CXR. Bedside ultrasound was completed using a linear probe to evaluate the thoracic cavity in two orthogonal planes bilaterally in the anterior, posterior and axillary spaces. Sub-centimeter consolidations were noted in the left posterior lungs. Focal consolidations concerning for pneumonia and atelectasis were noted in the posterior L lungs (Figs. 2 and 3). Increased frequency of B-lines consistent with a viral process were also noted on the left side. Interestingly, although chest x-ray when the patient initially presented was unremarkable, when the patient returned two days later, bilateral multifocal pneumonia was noted on the repeat x-ray (Fig. 1).

Ultrasound has been demonstrated to be a superior auxiliary tool in the assessment and stabilization of patients with a wide variety of applications. It has been shown to be greater than 90% sensitive and specific for lung pathology, compared with auscultation and chest x-ray which can yield variable and inconsistent results.[2] Pleural line irregularities and subpleural consolidations (of varied presentation) appear to be consistent findings in viral pneumonia, and have been noted in other cases of COVID-19.[1,2]

Although not as sensitive as chest CT scans for diagnosing COVID-19, ultrasound has significantly greater advantages in limiting infective spread of the virus to healthcare workers and other patients; additionally, the cost savings would allow for much broader applicability in lower resource settings, as high fidelity ultrasound models are increasingly becoming available for a fraction of the cost of CT scanners. There is need for further study of the utility and test performance of ultrasound for specific COVID-19 markers, and perhaps more widespread utilization in a wide variety of healthcare settings.

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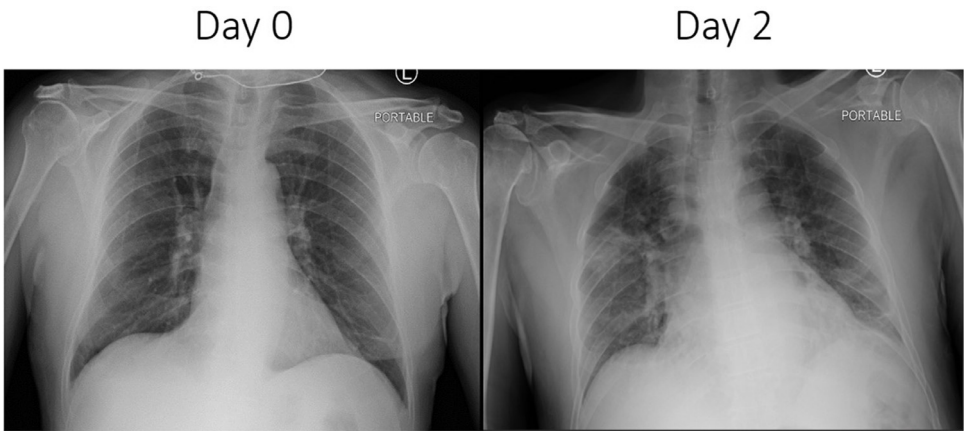

Fig. 1. Chest X-Ray, Portable AP view 3/29 (left) and 3/31 (right). Note the marked difference in opacification from initial ED presentation (within normal limits) and return two days later (diffuse multifocal pneumonia).

Questions

1 Which of the following statements is false in regard to COVID-19 infections?
   a Lung ultrasound findings in viral pneumonia can show irregularities and subpleural consolidations.
   b Lung ultrasound is more sensitive than CT scan in diagnosing COVID-19 pneumonia.
   c Lung ultrasound has greater than 90% specificity and sensitivity compared to auscultation and chest x-ray.
   d On CT scan, you can see findings such as consolidation, bilateral and peripheral opacities and greater lung involvement.
   e When using ultrasound to evaluate the lung and COVID-19 patients, detection of deep lesions can be limited due to blockage by solid consolidations.

2 Cardiac and pulmonary findings on ultrasound in patients with COVID-19 infections includes which of the following?
   a Irregular Pleural Line
   b Interstitial alveolar damage
   c Subpleural consolidations
   d Areas of white lung
   e All of the above

Answers

1 B. Lung ultrasound is more sensitive than CT scan in diagnosing COVID-19 pneumonia statements is false in regard to COVID-19 infections. Lung CT scan is superior to lung ultrasound in the evaluation of COVID pneumonia. A recent study showed that the sensitivity and specificity were greater than that of real-time PCR in detecting novel coronavirus infection. Chest CT might be a useful screening for COVID-19 for patients with clinical and epidemiological features compatible with COVID-19 infection particularly when RT-PCR testing is negative.

2 E. All of the above. Lung ultrasound can show signs suggestive of interstitial- alveolar damage that includes bilateral, diffuse pleural line abnormalities, subpleural consolidations, white out of lung areas and thick, irregular vertical artifacts.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.visj.2020.100796.

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