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## Visual Case Discussion

## Use of US to expedite diagnosis of PE in COVID-19 Patient

Mario Santiago (PA-C)\*, Stacy Abrams (PA-C), Jimmy Truong (DO, MS)

New York-Presbyterian/Columbia University Medical Center, Department of Emergency Medicine, 622 W 168th Street, New York, NY 10032



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## 1. Discussion

COVID-19 is a newly discovered Coronavirus that was identified in Wuhan, Hubei Province, China. Coronaviruses are normally the cause of respiratory illnesses like the common cold, but also similar to more severe viruses like MERS and SARS. One of the more serious symptoms with COVID-19 is that it causes patients to have shortness of breath requiring supplemental oxygen with a nasal cannula or non-rebreather, and in more severe cases, intubation. Using bedside Ultrasound to assess these patients can be a useful tool in the emergency department to quickly rule out other causes of dyspnea including pulmonary embolism in patients with shortness of breath, and tachycardia. During the pandemic, it is very easy to have anchoring bias to diagnosing someone with COVID-19 as there are many other etiologies with similar presenting symptoms. We aim to provide an example of using POCUS (point of care ultrasound) to illustrate that presenting patients can have multiple emergent diagnoses.

## 2. Visual Case Discussion

A 56 year old female presented to a busy NYC ED at the height of the COVID-19 pandemic. The patient had a past medical history of hypertension and asthma, and presented with shortness of breath and nonproductive cough for about two weeks. At triage, the patient's vitals were as follows: Temp: 36.4 F, HR: 141bpm, RR: 24, 110/60, and 88% O<sub>2</sub> sat on room air. The patient's O<sub>2</sub> saturations improved to 92% on nasal canula, then 97% on 15L/min via nonrebreather. The patient initially appeared dyspneic and tachypneic, however she appeared much more comfortable on NRB. ECG was performed, which revealed sinus tachycardia with a S1Q3T3 pattern (Figure 1). Portable CXR (Figure 2) revealed bilateral patchy opacities, likely multifocal viral and/or bacterial pneumonia. Basic labs, blood cultures, and our

institution's COVID-19 lab panel were drawn (of note, d-dimer was no longer on our panel at this time), along with a SARS-COV-2 swab. The patient's initial workup revealed leukocytosis with lymphopenia, elevated inflammatory markers along with LDH and ferritin, and an elevated high sensitivity troponin. While the patient appeared much more comfortable on the nonrebreather, she remained tachycardic. Bedside POCUS was performed. The IVC was noted to be plethoric with minimal respiratory variation. On the apical four cardiac view right heart strain was evident, with a dilated RV, bowing of the intraventricular septum, and McConnell's sign.<sup>1,2</sup> A pericardial effusion was also noted. Using these findings, the decision was made to obtain a CTA chest, which revealed "extensive central pulmonary emboli involving all five lobes". The patient's BP began slowly dropping, and the pulmonary embolism response team was consulted, who recommended medical management with thrombolysis. tPA was administered, and then unfractionated heparin was started. The patient was admitted to the ICU for massive PE, and was found to be COVID-19 positive. The patient had a good hospital course, and was able to be weaned off of oxygen and discharged after a 13 day admission, and transitioned to Apixaban as an outpatient.

## Questions

- All of the following are commonly seen on lung ultrasonography in patients suffering from COVID-19 and other viral pneumonias except?
  - B-lines
  - Absence of lung sliding
  - Subpleural consolidations
  - Pleural line irregularities
  - Air bronchograms
- On cardiac ultrasound, what is referred to as McConnell's sign?
  - Right ventricular dilation

\* Corresponding author.

E-mail address: [mas2551@cumc.columbia.edu](mailto:mas2551@cumc.columbia.edu) (M. Santiago).

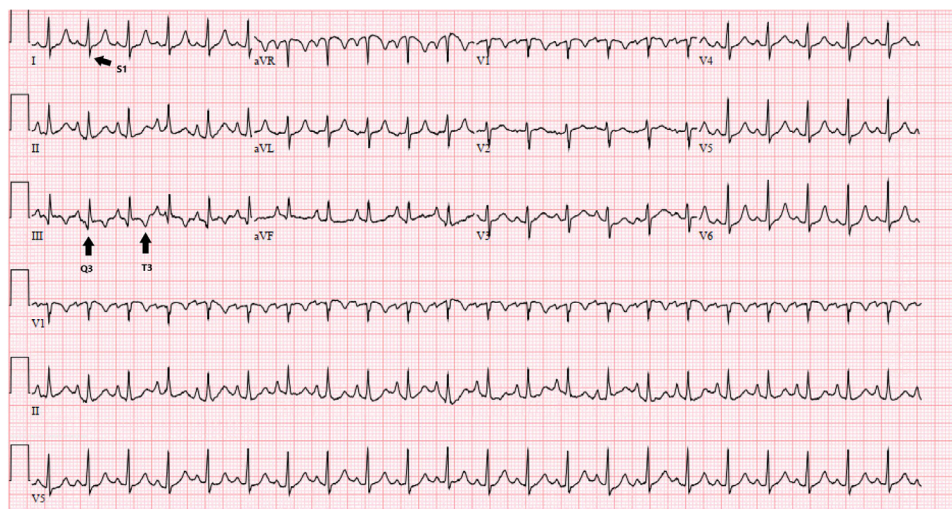


Figure 1. ECG displaying sinus tachycardia with S1Q3T3 pattern.

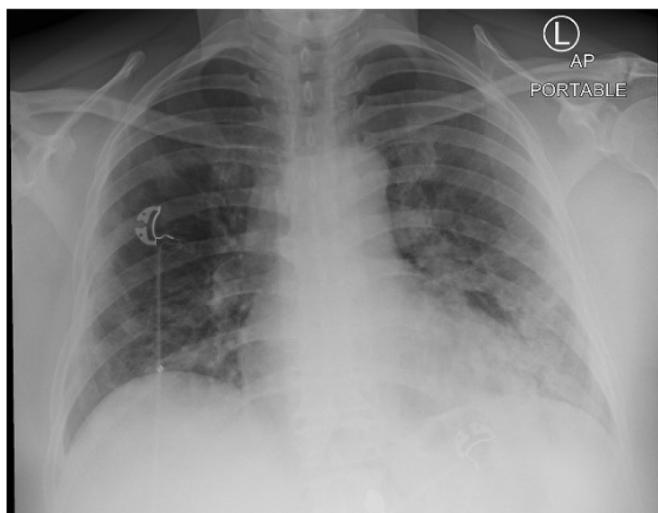


Figure 2. Portable CXR with diffuse bilateral opacities, consistent with COVID-19.

- b Bowing of the intraventricular septum
- c Akinesia of the RV free wall with sparing of the apex
- d Poor LV function
- e Mitral Valve Prolapse

#### Answers

- 1 B. All of the above answers, with the exception of B, are commonly present on lung ultrasonography in patients with viral pneumonias. The absence of lung sliding is commonly seen in patients with pneumothorax.
- 2 C. All of the above answers, with the exception of E, can be present with right heart strain and are possible indirect signs of PE. McConnell's sign is akinesia of the RV free wall with sparing of the apex, which seems hyperdynamic relatively. It is thought to be a sensitive and specific finding for acute right heart strain.<sup>3</sup>

#### Declaration of Competing Interest

We wish to confirm that there are no known conflicts of interest

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Signed by all authors as follows:

Mario Santiago PA-C  
Stacy Abrams PA-C  
Jimmy Truong DO, MS

#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.visj.2020.100789.

#### References

1. Mookadam F, Jiamsripong P, Goel R, Warsame TA, Emani UR, Khandheria BK. Critical appraisal on the utility of echocardiography in the management of acute pulmonary embolism. *Cardiol Rev.* 2010;18(1):29–37 Jan-Feb.
2. Bova C, Greco F, Misuraca G, Serafini O, Crocco F, Greco A, Noto A. Diagnostic utility of echocardiography in patients with suspected pulmonary embolism. *Am J Emerg Med.* 2003;21(3):180–183 May.
3. McConnell MV, Solomon SD, Rayan ME, Come PC, Goldhaber SZ, Lee RT. Regional right ventricular dysfunction detected by echocardiography in acute pulmonary embolism. *Am J Cardiol.* 1996;78(4):469–473 Aug 15.