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Rahim A Jiwani

Rita W. Rehana

Henry Ford Health, rrehana1@hfhs.org

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Cough to Dyspnea to Acute Respiratory Distress Syndrome



Dear Editor:

The outbreak of the novel coronavirus-2019 (COVID-19) was initially reported in Wuhan, China in December 2019 and has since rapidly spread globally. This has developed into a pandemic that has become a global health emergency effecting well-being, economic stability, and international societies. COVID-19 commonly clinically manifests as acute respiratory distress. Other clinical findings include and are not limited to acute thrombosis, gastrointestinal tract dysfunction, especially diarrhea, and liver dysfunction.^{1,2} The transmission route of virus is through respiratory droplets and fomite contact. The most accurate diagnostic test has been nasal and pharyngeal swabs to detect viral RNA. Furthermore, computed tomography has the most sensitivity with correlation to clinical symptoms, demonstrating peripheral ground glass opacities.³ We present one of the first cases of COVID-19 in our healthcare facility that presented with high clinical suspicion for the disease, however, the patient initially tested negative.

We describe a 52-year-old male with a past medical history of chronic kidney disease, hypertension, who presented to the hospital for fevers, chills, nausea, and diarrhea. He initially stated having intermittent nausea for 2 weeks, which developed into a headache that progressed to fevers and chills over 4-5 days. The patient denied recent travel or contact with anyone sick at home; however, he's a healthcare employee and comes into contact with patients. On presentation, he was febrile, with pulmonary exam significant for coarse breath sounds in bilateral lung fields. Chest x-ray revealed bibasilar atelectasis (Fig. 1). Bloodwork was significant for lymphopenia, azotemia, transaminitis and elevated ferritin. The patient became a high-risk person under investigation for COVID-19 given his clinical presentation and possibility of viral transmission via sick contacts through occupation. COVID-19 RNA nasal and pharyngeal swabs were obtained and resulted negative in 2 days. However, due to high clinical suspicion, the patient was retested for COVID-19. Other complications arose, such as acute on chronic renal failure requiring hemodialysis. On day 3, repeat chest x-ray showed development of multifocal airspace opacities including focal airspace opacities in bilateral upper lobes (Fig. 2). He was started on broad spectrum antibiotics for possible pneumonia. Throughout the hospital course, the patient had several bouts of hypoxia requiring escalation of supplemental oxygen. On day 6, he developed acute respiratory failure requiring ventilator support. The patient was unable to maintain adequate oxygenation

while ventilated and the family decided to compassionately extubate. On day 7, after the patient passed, the retest for COVID-19 returned positive.

This pandemic has demanded a steep learning curve on COVID-19 epidemiology, clinical presentation, diagnosis and treatment. The gold standard for detecting viruses is based on rapid detection, using real-time reverse transcription polymerase chain reaction (RT-PCR) for detection of SARS-CoV-2 RNA.⁴ The COVID-19 PCR RNA test has about a 70% sensitivity and if high suspicion is present, the clinical picture needs to be taken into account.⁵ The most commonly tested area is the throat, which has pharyngeal virus shedding at its highest point during day 4 of symptoms.⁶ Testing patients' different anatomical sites contribute to false negative results due to variation of viral load kinetics in the nasal cavity, pharynx, or sputum.⁷ Other contributing factors to false negative results include improper collection techniques, low viral RNA load or inoculation.⁴

Cycle threshold (Ct) of the PCR test has been proposed in multiple studies to be of high clinical value in determining infectivity of a given patient.⁸ Unfortunately Ct is not commonly reported or readily available to providers in our hospital. Serology testing for antibodies are also widely available, and indicate the patient has been infected, may still be infected, or has mounted some degree of an immune response to SARS-CoV-2. The Centers for Disease Control and Prevention has guidelines to assist in interpreting the serology test and RNA PCR test



FIGURE 1. Chest X-ray showing basilar subsegmental atelectasis.



FIGURE 2. Chest X-ray showing stable cardiomegaly. Development of multifocal airspace opacities including focal airspace opacities now seen within the bilateral upper lobes along with worsening focal airspace opacity in the right lung base and increasing consolidative changes in the left lung base.

results. Additionally, antigen tests detecting viral proteins are also coming into production, although they are much less sensitive with higher potential for false negative results.⁹

During this pandemic, test results drastically change not only patient care, but also cause mass effect on the hospital, health system and community. There is a high demand for further research on viral replication, immunity and viral shedding. Further research must be applied to optimize the timing of PCR testing in patients with suspected infection to avoid false negative results and mitigate spread of infection.

Rahim A. Jiwani MD¹
Rita W. Rehana MD^{2,*}

¹Department of Internal Medicine, Brody School of Medicine, East Carolina University, Greenville, North Carolina

²Department of Internal Medicine, Henry Ford Macomb, Clinton Township, Michigan

*E-mail: Rrehana1@hfhs.org

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