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A 60-year old Male with Dyspnea and Hypoxemia at the Start of a Global Pandemic

Urgent message: The identification and global impact of the novel coronavirus has significantly challenged medical decision-making. Urgent care providers now consider the inclusion of the SARS-CoV-2-causing illness in their differential diagnosis when evaluating patients with signs and symptoms of an acute respiratory infection.

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Introduction

As of March 2021, there have been more than 28.6 million documented cases of COVID-19 in the United States, with the majority of cases in those ages 18 to 64 years of age.[1] The first documented case in the United States was confirmed on January 19, 2020 with initial mild symptoms and progressing to a viral pneumonia. Since then, patients with COVID-19 have presented with a wide range of symptoms, though the overwhelming majorities still complain of fever, cough, and dyspnea.[2]

During the onset of the pandemic, it was unclear when to consider a diagnosis of COVID-19 in New York, especially due to an incomplete understanding of the epidemiological characteristics of the virus at that time.

The case discussed here occurred at that time, during which the total number of reported cases in New York City was slightly over 2,000; those were associated with approximately 30 deaths. We learned valuable lessons from this experience and now consider the inclusion of the novel SARS-CoV-2-causing-illness in our differential diagnoses when evaluating patients with signs of an acute respiratory infection.

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Case Presentation

CL, a 60-year old Caucasian male with a past medical history of hypertension and hypothyroidism, presents

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Table 1. Criteria for Systemic Inflammatory Response Syndrome (SIRS)

SIRS is confirmed in patients fulfilling at least two of the following criteria:
1. Fever >38.0°C or hypothermia <36.0°C
2. Tachycardia >90 beats/minute
3. Tachypnea >20 breaths/minute
4. Leukocytosis >12,000 mcL or leucopoenia <4,000/mcL

Source: Bone RC, Balk RA, Cerra FB, et al. Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. *Chest* 1992;101:1644-1655.

to urgent care with 10 days of worsening fatigue, a nonproductive cough, dyspnea on exertion, and intermittent fevers. He reports traveling domestically 2 weeks beforehand and recalls fatigue as his first symptom. The fatigue gradually became debilitating as time progressed and the patient explained that he had "sudden urges to cough by the third or fourth day" and "coughing fits that would cause me to lose my breath." The first time he took his temperature at home due to these symptoms was on day 4; it was 101°F at that time.

At this time, CL visited an urgent care facility, was diagnosed with an "upper respiratory tract infection," and was given a Z-Pak and a prednisone taper. He felt as if the prednisone was helping to improve his cough and shortness of breath; however, his symptoms gradually worsened.

By day 9, the patient states that he would sit on the couch at home and take short, shallow breaths to prevent what he referred to as "coughing attacks" and "burning chest pains on inspiration." CL reports living with a family member who is a healthcare worker. He denies any headaches, confusion, changes in vision, lightheadedness, syncope, numbness, or skin changes.

CL has a past medical history of stage 2 hypertension and primary hypothyroidism, managed with losartan 50 mg daily, hydrochlorothiazide 25 mg BID, and Armour Thyroid 90 mg daily. He has no history of pulmonary disease and has never been hospitalized except for a bilateral total hip arthroplasty 7 years ago. Family history is significant for paternal hypertension and type 2 diabetes, as well as lung adenocarcinoma on his mother's side. He lives at home with his wife and son, one of whom is a local healthcare worker and has recently exhibited similar symptoms.

The patient's review of systems was positive for fatigue, fever, chills, headache, appetite changes, sore throat, shortness of breath, and cough.

CL was febrile to 102.4°F and tachycardic to 110 BPM, with a SpO_2 of 84% on room air.

On physical exam, CL was tachypneic with orthostatic hypotension. He had erythema of the oropharynx with anterior cervical lymphadenopathy. Cardiovascular exam was notable for tachycardia. His pulmonary exam was remarkable for bibasilar rales and wheezing, along with increased vocal fremitus on the left.

Diagnostic Testing

At the urgent care, both rapid influenza and rapid strep tests were negative. An ECG was significant for tachycardia to 110; no ischemic changes were noted. A chest x-ray was significant for bilateral subtle lower lobe, ground-glass opacities with ill-defined patchy opacification of the left lower lobe. In a recent study involving 636 CXRs reviewed among COVID-19-positive patients in the greater New York area, ground-glass opacities or consolidation were seen on 18.9% and 5.3% of images, respectively.[3] According to Weinstock, et al neither age nor gender significantly affected the likelihood of more severe CXR abnormalities in patients diagnosed with COVID-19.[4]

Differential Diagnosis

Given the recent declaration of the pandemic, the overwhelming global panic, media coverage, and provider hypervigilance, we did consider COVID-19 in our differential diagnosis. However, we had not yet seen a case of SARS-CoV-2 causing a viral pneumonia.

Our top differential diagnoses included *viral pneumonia* (commonly caused by influenza, parainfluenza, rhinovirus, adenovirus, RSV, and now SARS-CoV-2) and *bacterial pneumonia* (commonly caused by streptococcus, HiB, mycoplasma, and legionella). It is not always easy to differentiate between the two; however, pleuritic chest pain, purulent sputum, abnormal vital signs, and localized opacity on CXR generally point toward a bacterial etiology.

It is important to note that ground-glass opacities have been implicated in many diseases, including viral pneumonia.[3,5] CL appeared toxic and met three out of four SIRS criteria (**Table 1**), including fever >38°C (patient: 39.1°C), tachycardia >90 BPM (patient: 102-110 BPM range), and tachypnea >20 breaths/min (patient: 24). As such, CL would need further workup for sepsis.

We considered acute bronchitis as a diagnosis, but it was not as likely given the CXR findings. Although the patient had symptoms of acute bronchitis, the cough was usually purulent and a high-grade fever is rare. While management of acute bronchitis is generally via supportive care, a 5-day azithromycin and a 6-day prednisone taper may have positively affected CL's overall hospital course.[6]

Given CL's symptoms, we also considered influenza, as some cases do present in March, though this was unlikely given negative antigen testing. We do understand that there are drawbacks to the diagnostic accuracy of rapid tests.[7]

Given the likelihood that the patient's symptoms were due to an infectious etiology, it was unlikely he was suffering from a pulmonary embolism. However, his calculated PERC (Pulmonary Embolism Rule-out Criteria) score was 3, which does not entirely rule out the possibility of a PE.[8]

Other diagnoses considered included those that were cardiac in origin; acid-base and electrolyte disturbances; drug toxicity; and anemia. Each of these was less likely, given CL's presentation and likely infectious diagnosis.

Management and Clinical Course

During the urgent care visit, the patient was asked a series of screening questions regarding symptoms, close contacts, and recent travel. His temperature was screened and he was found to be febrile. He was promptly placed in a private room and additional vital signs including SpO_2 were checked. At this time, EMS was notified, an ECG was performed, IV access was obtained, and the patient was placed on nasal cannula. CL was sent to a nearby hospital for additional workup and immediate intervention.

In the ED, the patient was managed with supplemental O_2 and broad-spectrum antibiotics. A repeat CXR confirmed ground-glass opacities and a left lower lobe pneumonia. He subsequently tested positive for COVID-19. The test was performed using the Abbot real-time polymerase chain reaction SARS-CoV-2 assay, which has both high sensitivity (93%) and high specificity (100%) for detecting the virus in clinical samples.[9]

Consequently, the patient was considered to have severe illness per NIH guidelines (see **Table 2**) and given the findings SpO_2 <94% and significant lung infiltrates.

CL was admitted for acute hypoxic respiratory failure secondary to COVID-19 pneumonia and placed in an isolation room with airborne and contact precautions. He was notably hypoxic on 10 L simple mask and was placed on high-flow nasal cannula, DVT prophylaxis, and managed with IV fluids, dexamethasone 6 mg IV qD, hydroxychloroquine + azithromycin (not currently recommended as sole COVID-19 treatment per July 17, 2020 NIH guidelines), and other antibiotics to cover for bacterial superinfection. Laboratory testing was remarkable for a slightly increased WBC count, but normal metabolic profile including renal function and LFTs, normal CRP/ESR, normal LDH, normal D-dimer, and ferritin. He spent 12 days in the hospital, was afebrile by day 7, and was discharged on home O_2 with an oxygen saturation of 94% on day 12 with 2-week follow-up.

Table 2. National Institutes of Health Clinical Spectrum of SARS-CoV-2 Infection

- Asymptomatic or presymptomatic infection—Individuals who test positive for SARS-CoV-2 using a virologic test (ie, a nucleic acid amplification test or an antigen test) but who have no symptoms that are consistent with COVID-19
- Mild illness—Individuals who have any of the various signs and symptoms of COVID-19 (eg, fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who do not have shortness of breath, dyspnea, or abnormal chest imaging
- Moderate illness—Individuals who show evidence of lower respiratory disease during clinical assessment or imaging and who have saturation of oxygen (SpO_2) ≥94% on room air at sea level
- Severe illness—Individuals who have SpO_2 <94% on room air at sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) <300 mm Hg, respiratory frequency >30 breaths/min, or lung infiltrates >50%
- Critical illness—Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction

Source: National Institutes of Health. Clinical spectrum of SARS-CoV-2 infection. Updated December 17, 2020. Available at: https://www.covid19treatmentguidelines.nih.gov/overview/clinical-spectrum/. Accessed April 16, 2021.

At his 2-week follow-up, the patient appeared well, but did complain of dyspnea on exertion—a common sequela of recent COVID-19 illness. A chest x-ray appeared unchanged from the previous CXR, but showed complete resolution of viral pneumonia at 6 weeks.

Discussion

Cases of SARS-CoV-2 causing COVID-19 first appeared in China in late 2019. Since then, the virus spread to nearly 180 countries and cases have been confirmed in all 50 U.S. states. The chances of dying from COVID-19 in the United States (number deaths/number confirmed cases) is approximately 3.22% (about 3.5% globally), while the crude mortality rate (number deaths/total population) is 0.053% (about 0.010% globally). This is in comparison to the 2003 SARS-CoV-1 virus with fatality rates reaching >9%.[10]

The CDC first reported common symptoms of COVID-19 as fever, cough, and shortness of breath. As the pandemic continues to progress, more symptoms are being documented, including those related to respiratory, cardiovascular, musculoskeletal, neurological,

and gastrointestinal systems.

Nonrespiratory symptoms typically precede the onset of respiratory symptoms in COVID-19 patients. Because of this, we may find it difficult to consider SARS-CoV-2 as the culprit of typical "urgent care" complaints. Clinical judgment is required in deciding which urgent care patients should undergo COVID-19 testing. Fortunately, there is guidance on the CDC website to help providers make well-informed clinical decisions.

"Providers should always take age and comorbidities into consideration, and reassure low-risk patients with a mild-to-moderate COVID-19 infection that they will likely be able to combat the illness on their own."

If a patient is asymptomatic, but has been in close contact with a person of interest or someone diagnosed with COVID-19, they do not necessarily need to undergo testing. However, close follow-up is advised and that patient should monitor their symptoms, as well as self-isolate for at least 14 full days.

Symptoms of COVID-19 will generally appear within 11.5 days in those with an identifiable exposure.[11] If symptoms are mild to moderate (ie, without pneumonia or hypoxemia), providers should consider viral testing and encourage self-isolation until test results are received. If testing is positive, the CDC recommends self-isolation for at least 10 days from symptom onset plus resolving symptoms and >24 hours without fever. If your patient does not fulfill these criteria, they must continue to quarantine.

It is important to note that an increase in illness severity usually occurs 5-8 days after initial symptom onset.[12] In order to determine a patient's risk for developing serious illness and adverse outcomes, we should always consider the patient's age, comorbidities, and immunocompromised status.

About 20% of patients will exhibit signs of severe illness and may require hospitalization to manage the most common complications of COVID-19.[13]

Those with severe symptoms should be tested for COVID-19, and clinical judgment should be used when considering possible transfer to the ED.

Our patient CL showed signs of severe disease including lung consolidation and an O_2 saturation <94%, therefore requiring further management in a hospital. Those in the hospital will undergo further diagnostic testing and treatment as per NIH guidelines, and approximately 6% will develop shock, organ dysfunction, and require mechanical ventilation in the ICU.[14]

The FDA approved the antiviral medication remdesivir for treatment of patients requiring hospitalization on October 22, 2020. If your patient has been diagnosed with COVID-19 at urgent care and is managed on an outpatient basis, encourage them to stay home, practice good hand hygiene, disinfect surfaces that they use, remain hydrated, take over-the-counter medications for fever and myalgia, avoid close-contacts or wear a mask around others, and closely monitor their symptoms for poor progression.

Providers should always take age and comorbidities into consideration, and reassure low-risk patients with a mild-to-moderate COVID-19 infection that they will likely be able to combat the illness on their own, as well as educate patients on the importance of close follow-up and indications for seeking emergency care. Urgent care providers should always consider transfer to the emergency department if patients exhibit signs and symptoms of severe COVID-19 illness. ■

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