

# Diagnosing Lemierre's Syndrome as the Cause of Multifocal Pneumonia During the COVID-19 Pandemic

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## ABSTRACT

A 21-year-old male with no past medical history presented with a sore throat, cough, and shortness of breath after attending a party days earlier. He was initially treated for community-acquired pneumonia, but subsequently developed a new oxygen requirement. CT imaging of the chest showed multifocal airspace disease, concerning for COVID-19. Testing for SARS-CoV-2 was negative by RT-PCR and antibody testing. Blood cultures subsequently grew *Streptococcus anginosus*. A CT scan of his neck demonstrated a right peritonsillar abscess and right internal-jugular thrombus, consistent with Lemierre's syndrome. He underwent incision and drainage of the peritonsillar abscess and completed 4 weeks of IV antibiotics, which improved his symptoms. It is important to recognize that the differential diagnosis of multifocal pneumonia is broad and includes Lemierre's syndrome. The COVID-19 pandemic presents challenges with regards to anchoring bias for multifocal pneumonia.

**KEYWORDS:** Lemierre's syndrome; multifocal pneumonia; COVID-19; peritonsillar abscess; anchoring bias

## BACKGROUND

The COVID-19 pandemic has had a significant impact on the delivery of health care with specialized precautions and limited face-to-face interactions. Lack of personal protective equipment, a paucity of testing, shelter in place and stay-at-home orders, as well as patient avoidance of medical settings during the initial phases of the pandemic affected both urgent and non-emergent care.<sup>1,2,3</sup>

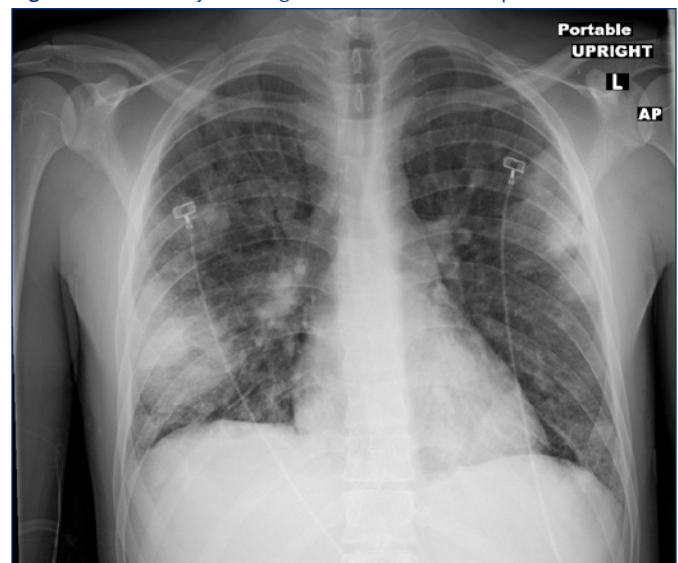
Given the widespread community transmission of SARS-CoV-2, it was important to cohort patients with COVID-19 together and to separate them from patients without COVID-19 symptoms. As such, determining whether or not a patient had COVID-19 became very important to reduce transmission.<sup>1</sup> This strong focus on determining a patient's COVID-19 status up front presented challenges with anchoring biases as illustrated in the following case.

## CASE REPORT

A 21-year-old male with no significant past medical history presented to an outside hospital's emergency department with sore throat, fever, chills, muscle aches, and non-bloody emesis. The patient attended a July 4th party with about 20 individuals and his symptoms began the following day and worsened as the week progressed. Five days later he developed a cough with non-radiating bilateral chest pain, exacerbated by coughing. He presented to the emergency department with an unremarkable physical exam, and was found to have multifocal airspace disease on chest X-ray. Labs were notable for sodium of 125, potassium of 3.5, and white blood cell count (WBC) of 12.1k with 6% bands. SARS-CoV-2 RT-PCR was collected. The patient was discharged from the ED with doxycycline for empiric treatment of bacterial pneumonia while awaiting the SARS-CoV-2 RT-PCR result, which was subsequently negative.

The patient presented again 3 days later with worsening cough, chest pain, and shortness of breath. Exam was notable for new pharyngeal exudates and posterior oropharyngeal erythema, diffuse rales, and he appeared to be in acute distress. Chest X-ray was repeated (**Fig. 1**) and showed worsening multifocal airspace disease. Repeat SARS-CoV-2 RT-PCR, respiratory pathogen panel (RPP), and streptococcal throat

**Figure 1.** Chest X-ray showing bilateral multifocal airspace disease.

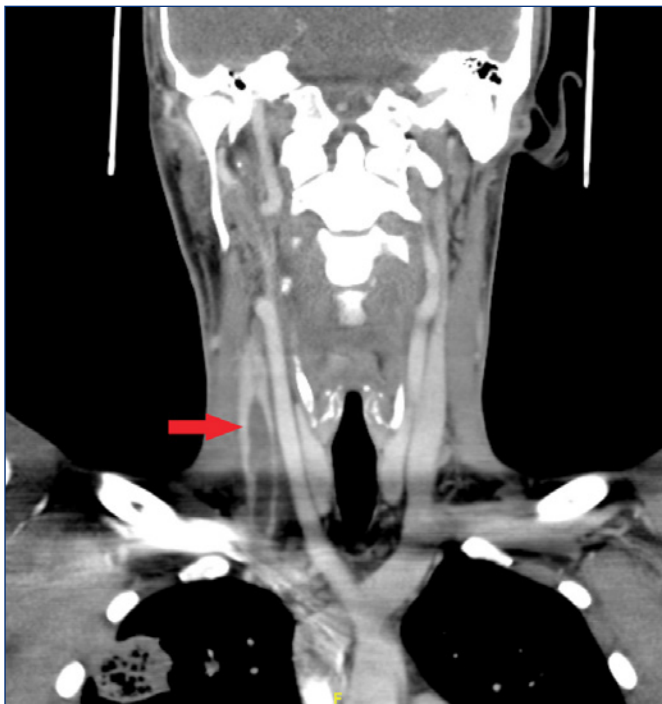


culture and group A PCR were negative. Blood cultures were sent. The patient was found to be hypoxic requiring 2 L of supplemental oxygen by nasal cannula to maintain normal oxygen saturation. Despite negative SARS CoV-2 tests, the new oxygen requirement and abnormal laboratory and X-ray

**Figure 2.** CTA Chest PE protocol (axial view) showing dense consolidation on right side.



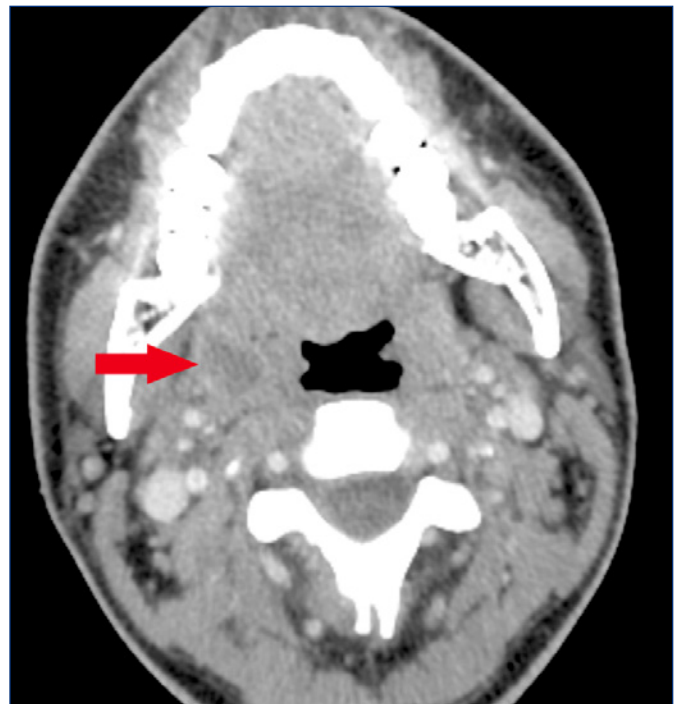
**Figure 3.** Contrast CT Neck (coronal view) showing with right internal jugular vein thrombus.



findings were concerning for impending decompensation for what was presumed to be COVID-19, and the patient was transferred to our facility in the event of worsening hypoxic respiratory failure requiring intubation.

At the accepting hospital, CT angiogram (CTA) was performed to rule out pulmonary embolism, as the patient had an elevated d-dimer level and persistent oxygen requirement. The CTA was negative for acute pulmonary embolus but demonstrated multifocal airspace disease (Fig. 2). SARS-CoV-2 IgG antibody was sent (IgM testing was not available) due to concern for possible COVID-19 and the potential for false-negative RT-PCR tests. He was started empirically on piperacillin-tazobactam as antibiotic coverage for severe bacterial pneumonia. SARS-CoV-2 antibodies were negative, but blood cultures drawn prior to transfer grew gram-positive cocci, subsequently identified as *Streptococcus anginosus*, a non-group A streptococcal organism. At this point, given positive blood cultures and multiple negative tests for SARS-CoV-2, the diagnosis of COVID-19 was ruled out by day 9 of symptoms, and COVID-19 isolation precautions were removed. Antibiotic regimen was tailored to ceftriaxone and vancomycin. Due to his initial presenting complaint of sore throat, a CT scan of the neck was performed revealing a non-occlusive thrombus in the right internal jugular vein (Fig. 3) with a right peritonsillar abscess. Repeat CT scan of the neck (Fig. 4) several days later demonstrated interval increase in size of the peritonsillar abscess. Otolaryngology (ENT) was consulted and performed a bedside incision and drainage. Hematology was consulted

**Figure 4.** Contrast CT Neck (axial view) showing right peritonsillar abscess.



and recommended against anticoagulation. MRI of the brain revealed no associated emboli. The patient's oxygen requirement ultimately resolved, and the patient was discharged on ceftriaxone for a total of 4 weeks. The patient was noted to have clinical improvement and resolution of his symptoms 2 weeks after hospital discharge at an Infectious Disease follow-up appointment.

## DISCUSSION

Lemierre's syndrome, first described in 1936 by the French physician André-Alfred Lemierre, typically occurs in healthy teenagers and young adults, and is characterized by anaerobic septic emboli originating from a primary oropharyngeal infectious site, such as a tonsillar or peritonsillar abscess.<sup>4</sup> The abscess causes thrombophlebitis of the internal jugular vein, owing to its close proximity to the oropharynx. Symptoms typically begin with a sore throat followed by high fevers, rigors, and jaw and neck muscle pain. Rigors can peak around days 8 to 12. Pulmonary abscesses can cause blood-stained or rusty sputum and chest pain.<sup>4</sup> Organisms such as *Fusobacterium necrophorum*, *Fusobacterium nucleatum*, *Fusobacterium* species, *Streptococci* species, *Staphylococcus aureus*, MRSA, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* are typically implicated.<sup>5</sup>

With the widespread use of antibiotics, Lemierre's syndrome is rare and is sometimes referred to as "the forgotten disease."<sup>2,5</sup> This classic presentation of Lemierre's syndrome was not high on the initial differential diagnosis for the patient's worsening multifocal pneumonia due to his presentation with non-specific COVID-like symptoms following attendance at a large gathering. At the time of diagnosis in July 2020, the prevalence of COVID-19 in Rhode Island was estimated at 4% with 11.6% of confirmed cases being hospitalized.<sup>6</sup> Because of the ongoing COVID-19 pandemic and concern for a highly transmissible infectious disease, the initial diagnosis of multifocal pneumonia was thought to be due to COVID-19, as this had been the most common form of multifocal pneumonia present in the community. As a result, Lemierre's syndrome was not on the differential when this patient was initially evaluated and triaged, due to anchoring bias towards COVID-19, despite physical exam findings suggestive of Lemierre's.

Similar cases have been reported in adolescents and young adults ultimately diagnosed with Lemierre's syndrome following presumed COVID-19 infection.<sup>7,8</sup> Key to making the diagnosis of Lemierre's syndrome in this case was re-consideration of the patient's presenting symptoms, especially his sore throat. His infectious work-up at that point (two negative SARS-CoV-2 RT-PCR, negative SARS-CoV-2 antibody, negative RPP, negative throat culture and blood cultures positive for *Streptococcus anginosus*) led to CT of the neck which demonstrated a tonsillar abscess and septic internal jugular thrombus.

Lemierre's syndrome is typically diagnosed clinically: an adolescent or young adult experiences sore throat followed by fevers, chest pain, and shortness of breath. Blood cultures or drainage of a pharyngeal abscess can confirm the causative organism and guide antibiotic treatment. Length of antibiotic therapy is on the order of weeks, and selection guided by the causative organism, though usually a penicillin.<sup>5</sup> Anticoagulation for associated septic thrombi is controversial, and there is little research on this particular aspect of the syndrome.<sup>5,9</sup>

With the COVID-19 pandemic there has been a strong focus on avoiding physical contact between patients and physicians on multiple levels to protect physicians from potentially sick patients and vice versa.<sup>11</sup> Physical exam components that could be aerosol-generating are minimized to decrease the risk of generating infectious droplets.<sup>12</sup> Incomplete physical exams can potentially lead to delayed diagnoses. However, in this patient's case, the history and examination pointed towards an ongoing pharyngeal infection and subsequent respiratory distress. The respiratory distress component was focused on more than the accompanying sore throat, leading to the anchoring bias towards COVID-19. In retrospect, this combination of findings is typical for a presentation of Lemierre's syndrome.

This case demonstrates the risks of anchoring bias (focusing on a particular facet of a case) and premature closure (closing of the diagnostic process before all relevant information is obtained)<sup>10</sup> as COVID-19 was initially highest on the differential given its high community prevalence at the time of presentation. Lemierre's syndrome was not considered despite initial complaints of sore throat, and congruent examination findings. The consequences of these cognitive errors are well documented, and include increased medical errors, lower standard-of-care ratings, and increased complications.<sup>13,14</sup>

## CONCLUSIONS

The diagnosis of multifocal pneumonia and presumed COVID-19 distracted from further evaluation of the patient's chief complaint of sore throat. Consequently, the non-occlusive thrombus and peritonsillar abscess were not identified for several days after initial presentation. These factors resulted in the delay in treatment of a classic presentation of Lemierre's syndrome in a young adult. The breadth of symptoms associated with SARS-CoV-2 overlap significantly with other illnesses, reinforcing the importance of a broad differential diagnosis in such cases.

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