

CASE REPORT

A Patient with *Escherichia coli* Bacteremia and COVID-19 Co-Infection: A Case Report for the Louisville COVID-19 Epidemiology Study

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Abstract

Patients with COVID-19 may have co-infections with other microorganisms. Here we report a case of a patient with an *E. coli* bacteremia secondary to a urinary tract infection, who experienced fevers while on active antimicrobial therapy. The patient was eventually tested for COVID-19 and found to be positive. This case emphasizes the need to suspect COVID-19 even in patients with documented bacterial infection.

Introduction

Current CDC guidance encourages health care providers to consider testing for SARS-CoV-2 infection in patients with signs and symptoms consistent with COVID infection. [1] Reports of both viral and bacterial co-infection are now emerging. [2-6] We describe a patient with *E. coli* bacteremia secondary to a urinary tract infection, who developed persistent high fevers despite receiving appropriate antimicrobial therapy based on susceptibility results. Due to clinical deterioration, the patient was tested for novel coronavirus infection and found to have a positive nasopharyngeal PCR. Our case report serves as a caution against ruling out SARS-CoV-2 when another infectious process may not fully explain a patient's symptoms.

Case Presentation

A 64-year-old white male presented to the emergency department with a chief complaint of burning with urination starting 4 days prior to admission. His past medical history was significant for type 2 diabetes mellitus, hypertension and pancreatitis. The patient also endorsed urinary retention, gait instability, nausea, vomiting and chills. Blood and urine cultures were collected, both of which grew pan-susceptible *E. coli*. The patient received active antibiotics for his *E. coli* infection throughout his hospitalization.

On hospital day 2, the patient had a urinary catheter placed due to continued urinary retention. He also reported diarrhea and was tested for *C. difficile* infection, which was negative. Repeat blood cultures were obtained and demonstrated no growth, confirming clearance of the patient's bacteremia.

On hospital day 4, a CT of the abdomen/pelvis was obtained, which noted an evolving prostate abscess (**Figure 1**). Of note, the patient also began reporting a dry cough and developed high fevers with a maximum temperature of 103.4° F. That evening, he required BiPAP in order to maintain SaO₂ >90%. He was eventually intubated due to respiratory failure. At this point, a nasopharyngeal COVID-19 PCR test was obtained due to rapid clinical deterioration despite adequate management of the patient's bacterial infection. The patient was also placed into COVID-19 appropriate isolation.

The patient went on to develop multi-organ failure, including acute respiratory distress

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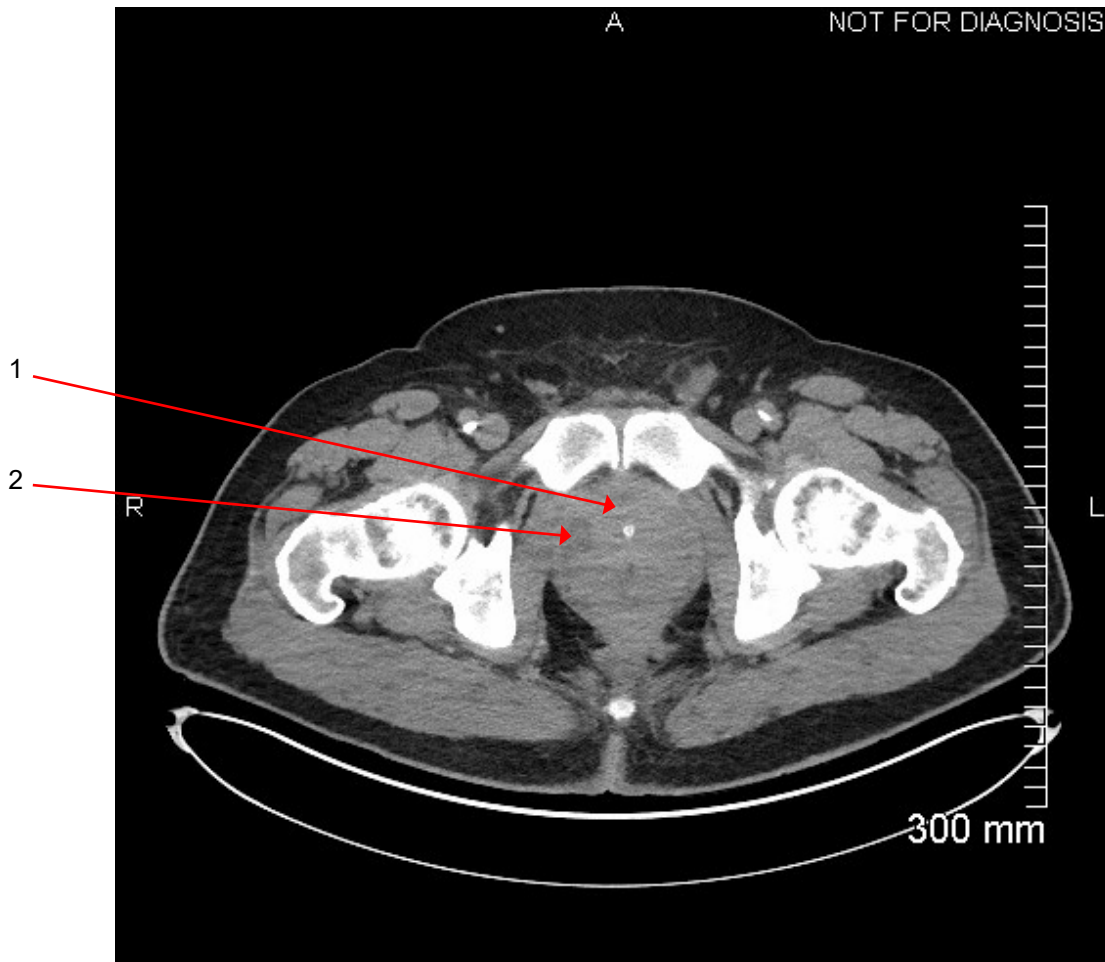


Figure 1. CT abdomen/pelvis obtained on hospital day 2. Findings significant for enlarged prostate (1), seminal vesicles and thick-walled urinary bladder (not visualized here). New focal 2 x 1.3 cm region of decreased attenuation at the right lateral periphery of the prostate (2). It is unclear if this represents phlegmon/early abscess in the setting of prostatitis.

syndrome (**Figure 2**), and required continuous renal replacement therapy and multiple vasopressors to maintain MAP >65 mmHg. On hospital day 9, the COVID-19 PCR test resulted positive, confirming COVID-19 coinfection. At this time, the patient was non-responsive off sedation and was compassionately extubated shortly thereafter.

Discussion

SARS-CoV-2 can present with a constellation of non-specific symptoms. In our patient, nausea and diarrhea were possibly the first COVID-19 related symptoms to present. This was followed by a non-productive cough, fevers, and eventual respiratory decompensation. [7,8] Initially, the patient's fevers while on antibiotics were thought to be attributable to his undrained prostate abscess. However, given that this patient was initially afebrile and then developed high fevers while receiving antibiotics, this raised suspicion for a second infectious process. The median incubation period of SARS-CoV-2 appears to be about 5 days. Lauer et al reported that in their cohort, <2.5% of patients displayed any symptoms within 2.2 days. [9-11] Based on this information, it seems most likely that our patient acquired COVID-19 prior to presenting to the hospital.

Guidelines from the Surviving Sepsis Campaign suggest that based on current evidence, the presence of another respiratory pathogen does not necessarily rule out the possibility of COVID-19. [12] In this case, there was delay in clinical suspicion and COVID-19 testing. During the first four days of hospitalization, the patient was not in isolation resulting in numerous healthcare worker exposures. This highlights the importance of the aforementioned recommendation. Universal patient screening upon admission may have identified this patient as a COVID-19 case earlier.

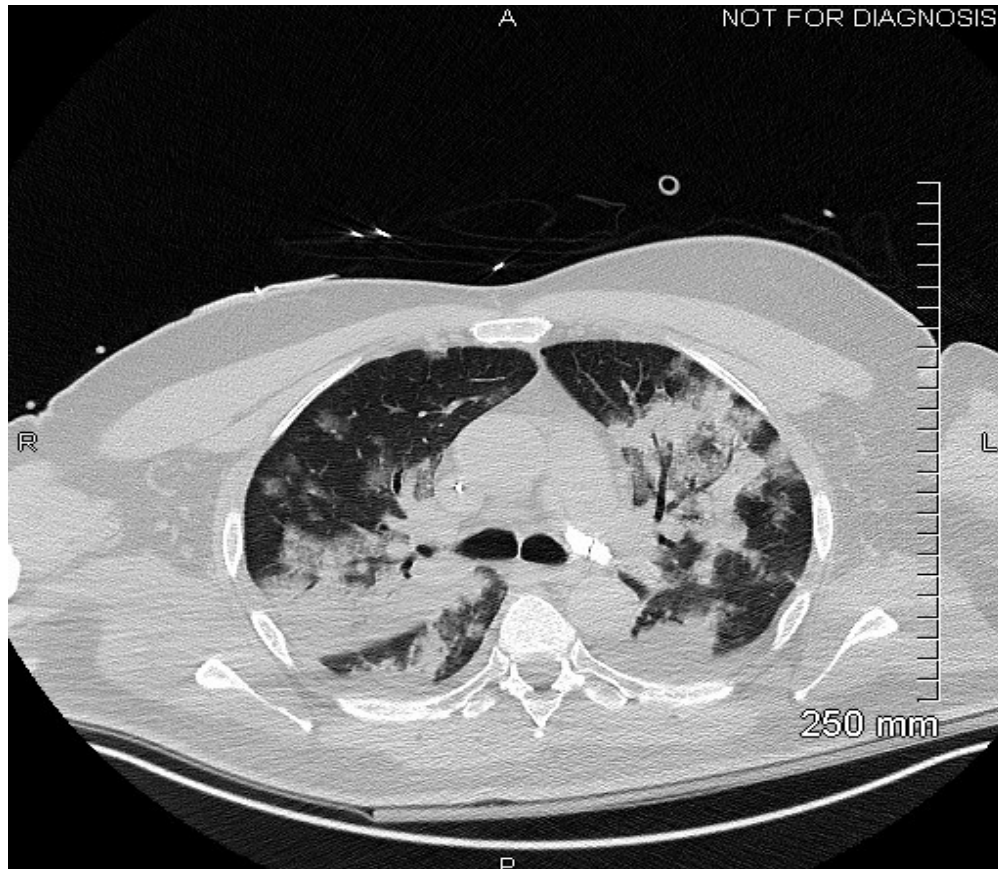


Figure 2. CT chest obtained on hospital day 5. Findings include extensive bilateral dense consolidation involving the upper and lower lobes. There is a small left pleural effusion. Overall appearance is consistent with widespread pneumonia and acute respiratory distress syndrome (ARDS).

Clinical outcomes in patients with COVID-19 and bacterial coinfections have not been well-described. Fan and colleagues describe a case of a patient with COVID-19 and *M. pneumoniae* infection. [3] These authors suggest that failing to treat other causes of infection in COVID-19 patients is likely to increase morbidity and mortality.

Worse outcomes were observed in patients with bacterial coinfection and H1N1 influenza. These patients were more likely to require mechanical ventilation and longer ICU stays than patients without coinfection. [13] Additionally, patients with bacterial coinfection had an inpatient mortality rate of 31%, versus 21% in patients with influenza alone ($p=0.002$). [13] It is possible that similar outcomes may be observed in the SARS-CoV-2 pandemic, but further data is needed before any conclusions may be drawn.

In conclusion, this case highlights the importance of considering COVID-19 infection even in the setting of a confirmed alternate infectious diagnosis. Clinicians should consider isolation and testing for coinfection if clinically appropriate.

References

1. Centers for Disease Control and Prevention. Evaluating and testing persons for coronavirus disease 2019 (COVID-19). National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases. 2020 Apr. <https://www.cdc.gov/coronavirus/2019-nCoV/hcp/clinical-criteria.html>
2. Touzard-Romo F, Tapé C, Lonks JR. Co-infection with SARS-CoV-2 and human metapneumovirus. *R I Med J* (2013). 2020 Mar;103(2):75–6. Available from: <https://www.ncbi.nlm.nih.gov/nlmcatalog/101605827> PMID:32192233
3. Fan BE, Lim KG, Chong VC, Chan SS, Ong KH, Kuperan P. COVID-19 and mycoplasma pneumoniae coinfection. *Am J Hematol*. 2020 Mar 15. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/ajh.25785>

4. Khodamoradi Z, Moghadami M and Lotfi M. Co-infection of coronavirus disease 2019 and influenza A: a report from Iran. *Arch Iran Med.* 2020;23(4):239-243.
5. Kim D, Quinn J, Pinsky B, Shah NH, Brown I. Rates of co-infection between SARS-CoV-2 and other respiratory pathogens. *JAMA.* 2020 Apr;323(20):2085. <https://doi.org/10.1001/jama.2020.6266> PMID:32293646
6. Sun Y, Koh V, Marimuthu K, Ng OT, Young B, Vasoo S, et al. Epidemiologic and clinical predictors of COVID-19. *Clin Infect Dis.* 2020;ciaa322.; [Epub ahead of print]. <https://doi.org/10.1093/cid/ciaa322>.
7. Sun Y, Koh V, Marimuthu K, Ng OT, Young B, Vasoo S, Chan M, Lee VJ, De PP, Barkham T, Lin RT. Epidemiological and clinical predictors of COVID-19. *Clin Infect Dis.* 2020 Mar 25.
8. D'Amico F, Baumgart DC, Danese S, Peyrin-Biroulet L. Diarrhea during COVID-19 infection: pathogenesis, epidemiology, prevention and management. *Clin Gastroenterol Hepatol.* 2020 Apr 8. <https://www.ncbi.nlm.nih.gov/pubmed/32278065>
9. Linton NM, Kobayashi T, Yang Y, Hayashi K, Akhmetzhanov AR, Jung SM, et al. Incubation period and other epidemiological characteristics of 2019 novel coronavirus infections with right truncation: a statistical analysis of publicly available case data. *J Clin Med.* 2020 Feb;9(2):1–9. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7074197/pdf/jcm-09-00538.pdf> <https://doi.org/10.3390/jcm9020538> PMID:32079150
10. Linton NM, Kobayashi T, Yang Y et al. Incubation period and other epidemiological characteristics of 2019 novel coronavirus infections with right truncation: a statistical analysis of publicly available case data. *J Clin Med* 2020;9(2):1-9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7074197/pdf/jcm-09-00538.pdf>
11. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, Ren R, Leung KS, Lau EH, Wong JY, Xing X. Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. *N Engl J Med.* 2020 Mar;382(13):1199–207. https://www.nejm.org/doi/10.1056/NEJMoa2001316?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dwww.ncbi.nlm.nih.gov
12. Alhazzani W, Møller MH, Arabi YM, Loeb M, Gong MN, Fan E, Oczkowski S, Levy MM, Derde L, Dzierba A, Du B. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). *Intensive Care Med.* 2020 Mar 28:1-34. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7101866/pdf/134_2020_Article_6022.pdf
13. Rice TW, Rubinson L, Uyeki TM, Vaughn FL, John BB, Miller RR 3rd, et al.; NHLBI ARDS Network. Critical illness from 2009 pandemic influenza A virus and bacterial coinfection in the United States. *Crit Care Med.* 2012 May;40(5):1487–98. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3653183/pdf/nihms463168.pdf>, <https://doi.org/10.1097/CCM.0b013e3182416f23> PMID:22511131