# Lung Base Findings of Coronavirus Disease (COVID-19) on Abdominal CT in Patients With Predominant Gastrointestinal Symptoms

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**OBJECTIVE.** This series of patients presented to the emergency department (ED) with abdominal pain, without the respiratory symptoms typical of coronavirus disease (COVID-19), and the abdominal radiologist was the first to suggest COVID-19 infection because of findings in the lung bases on CT of the abdomen.

**CONCLUSION.** COVID-19 infection can present primarily with abdominal symptoms, and the abdominal radiologist must suggest the diagnosis when evaluating the lung bases for typical findings.

New information on coronavirus disease (COVID-19) is released daily. No clear end to the pandemic is in sight, and recognition of atypical clinical presentations on imaging is necessary to provide timely treatment and prevent spread. Little has been published about presentation of patients with COVID-19 with symptoms besides fever and respiratory problems, and many patients are not offered testing if they do not have these two typical symptoms. However, not all patients present with the expected symptoms; in fact, CT findings may precede any symptoms, and some patients with COVID-19 may be completely asymptomatic and undergo imaging for another reason entirely [1]. Thus, abdominal radiologists must pay close attention to the lung bases on any CT, even in the absence of reported respiratory symptoms.

In the last 2 weeks of February 2020, several patients presented in the emergency department (ED) of the University of Chicago Hospital with abdominal pain and without significant respiratory symptoms, underwent CT of the abdomen and pelvis, and had findings in the lung bases suggestive of COVID-19. Follow-up testing ultimately confirmed the suspected infection. These lung base findings observed on abdominal CT were the first indicators of COVID-19.

Therefore, knowledge of the appearance of COVID-19 infection in the lungs is important for radiologists in all subspecialties. Abdominal radiologists need to be aware that patients may present with abdominal complaints, and the lung bases should not be overlooked. This article introduces an atypical, if somewhat nonspecific, primary presenting symptom of COVID-19: abdominal pain.

## Materials and Methods

Three patients undergoing CT of the abdomen and pelvis for abdominal pain with subsequent diagnosis of COVID-19 were retrospectively identified by search of saved case lists and application of natural language processing (NLP) to the electronic medical record (EMR). The NLP search included patient data containing the keywords "abdominal pain" and "COVID-19" or "novel coronavirus" for patients who underwent CT of the abdomen and pelvis. CT (GE Revolution, GE Healthcare) of the abdomen and pelvis with or without contrast enhancement was performed in the ED.

Inclusion criteria required that patients originally presented with a chief complaint of abdominal pain, without significant respiratory complaints, had CT findings in the lung bases suspicious for COVID-19 but for whom COVID-19 was not a differential consideration at the time of presentation in the ED. Cases were confirmed with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) polymerase chain reaction (PCR) laboratory testing (cobas SARS-CoV-2 Test, Roche).

All three patients were men and ranged from 26 to 50 years old.

## Results

Findings in the lung bases were described by the abdominal radiologists as peripheral and subpleural ground-glass opacities, often bilateral, with nodular configuration, which

**Keywords:** abdominal CT, coronavirus, COVID-19, imaging findings, lung bases, SARS-CoV-2

doi.org/10.2214/AJR.20.23232

Received March 30, 2020; accepted after revision April 3, 2020.

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*AJR* 2020; 215:1–3

ISSN-L 0361–803X/20/2153–1

is an appearance that is not specific but that is typical of COVID-19. The differential diagnosis was suggested by the abdominal radiologist first, and was not originally suspected in the ED because of the lack of typical, expected pulmonary symptoms. Subsequent SARS-CoV-2 PCR testing confirmed these suspicions.

The images were obtained from CT examinations of the abdomen and pelvis ordered for abdominal symptoms. Review of the ED EMR notes show that at the time of presentation, COVID-19 was not clinically suspected. In these cases, abdominal radiologists were the first to raise the possibility of COVID-19.

### *Case 1*

A 26-year-old man with a history of diabetes and hypertension presented with 7 days of fever, chills, nausea, intractable vomiting, diarrhea, and generalized weakness, but no specific upper or lower respiratory symptoms aside from mild shortness of breath. The patient was diaphoretic and retching on arrival. Physical examination showed diffuse abdominal tenderness, mild tachypnea, and tachycardia. CT of the abdomen and pelvis revealed imaging findings in the lung bases of peripheral nodular airspace and ground-glass opacities that raised concern for COVID-19 (Fig. 1). Abdominal imaging findings showed hepatosplenomegaly and severe hepatic steatosis; no abnormalities in the gastrointestinal tract, mesentery, or vasculature; and no lymphadenopathy or ascites. Subsequent CT chest and SARS-CoV-2 PCR testing confirmed the diagnosis of COVID-19. The patient was admitted to the hospital with a primary diagnosis of diabetic ketoacidosis, the likely cause of his abdominal pain, secondary to SARS-CoV-2 infection. The patient was discharged home 9 days later.

### *Case 2*

A 40-year-old man presented with 1 week of fevers, chills, nausea, vomiting, diarrhea, and intermittent abdominal pain but no specific upper or lower respiratory symptoms aside from mild shortness of breath. The clinical examination was notable for right lower quadrant tenderness at the McBurney point. The chest radiograph showed normal findings. CT of the abdomen showed findings of peripheral nodular ground-glass opacities, typical of COVID-19, in the lung bases (Fig. 2). Abdominal imaging findings showed a left renal mass with fluid attenuation; fluid-filled stomach; normal findings in the vasculature, gastrointestinal tract, and mesentery without wall thickening or distention; and no lymphadenopathy or ascites. CT of the chest and SARS-CoV-2 PCR testing were subsequently performed and confirmed the diagnosis. The patient was admitted to the hospital with a primary diagnosis of intractable nausea and vomiting thought to be secondary to a viral process. The patient recovered with supportive care and was discharged home 3 days later.

### *Case 3*

A 50-year-old man with a history of gastric ulcers and partial gastrectomy presented with 5 days of fever, epigastric abdominal pain, right flank pain, and diarrhea but denied cough or shortness of breath. He had notable tenderness in the epigastrium and right flank, prompting evaluation with a CT of the abdomen. This study revealed bibasilar peripheral nodular ground-glass opacities characteristic of COVID-19 in the lungs (Fig. 3). Abdominal imaging findings showed a right renal cyst and uncomplicated postsurgical changes from the patient's partial gastrectomy, without any other gastrointestinal, mesenteric, or vascular abnormalities, and no lymphadenopathy or ascites. The patient was discharged home from the ED with strict return precautions, a nonspecific diagnosis of epigastric pain, and instructions to self-quarantine because of suspected COVID-19. The results of his SARS-CoV-2 PCR test were returned as positive several hours after his departure from the hospital. He did not have any repeat hospital encounters within the 2 weeks after his ED visit.

## Discussion

Established and published lung imaging findings for COVID-19 include multifocal peripheral ground-glass opacities, with nodular configuration and slight predominance in the lower lung. Pleural effusions are usually absent [2]. Although the appearance is not specific for COVID-19, in this time of the pandemic, these findings should prompt suspicion for infection with SARS-CoV-2.

The presentation of patients with COVID-19 can vary, from asymptomatic to mild respiratory symptoms to acute respiratory distress syndrome. More atypically, patients can present with nonrespiratory chief complaints such as abdominal pain and diarrhea [3]. Although most patients present to the hospital with fever or respiratory symptoms, a recent study reported that nearly 20% presented with a digestive symptom, such as diarrhea, vomiting,

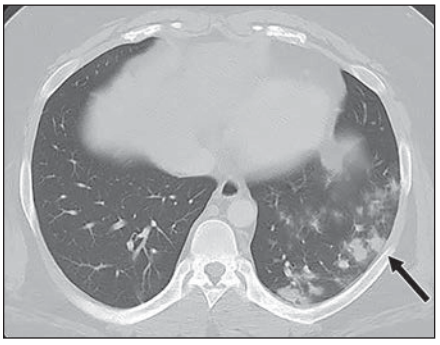

**Fig. 1**—26-year-old man who presented with abdominal tenderness and gastrointestinal complaints. Axial CT of abdomen and pelvis shows left basilar round airspace and ground-glass opacities (*arrow*). Appearance is highly compatible with atypical infection such as coronavirus disease (COVID-19) pneumonia.

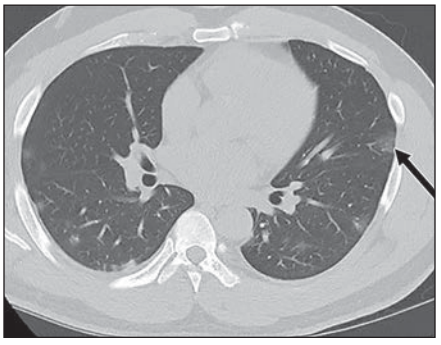

**Fig. 2**—40-year-old man with abdominal pain and gastrointestinal symptoms. Axial CT of abdomen and pelvis shows multifocal subpleural ground-glass opacities (*arrow*) in visualized lungs. This nonspecific finding may be result of atypical infection such as coronavirus disease (COVID-19) pneumonia.

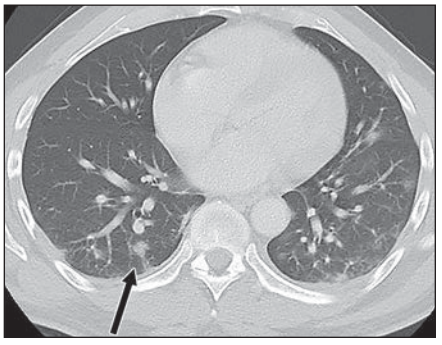

**Fig. 3**—50-year-old man with epigastric and flank pain and diarrhea. Axial CT of abdomen and pelvis shows bilateral peripheral and basilar-predominant ground-glass and nodular opacities (*arrow*), suggestive of coronavirus disease (COVID-19).

and abdominal pain, and around 5% presented with digestive symptoms alone, without respiratory symptoms [4]. Although the abdominal pain experienced by our patients may or may not have been related o SARS-CoV-2 infection, reports of patients infected with SARS-CoV-2 who experience no symptoms are well documented, and COVID-19 symptoms vary; therefore, it is important not to be lulled into a false sense of security by a chief complaint of abdominal pain [1].

The abdominal radiologist must review the lung bases when evaluating CT images of the abdomen for clues of the disease. The fact that we observed several patients presenting in this way in such a short time period suggests that although abdominal symptoms are an unusual presentation of the infection, they are not rare, and abdominal radiologists must be on the lookout to diagnose COVID-19, even when it is not suspected clinically. When clinicians are not suspicious of COVID-19, it is the responsibility of the abdominal radiologist to include it in the differential diagnosis. By paying attention to lung bases on CT imaging, abdominal radiologists will aid in diagnosing COVID-19 with primarily extrapulmonary symptoms, allow a timely diagnosis, protect health care workers, and possibly even reduce the spread of the disease [4].

When reporting suspected incidental COVID-19 according to findings in the lung bases, clinicians and chest imagers should be consulted about the accepted method to document findings at the institution. Direct communication with the referring provider is always the first step. Although raising the possibility of COVID-19 to the clinician is appropriate, it is also acceptable to document the possibility of "viral pneumonia" as a general term that allows clinical input into the decision-making [5].

## Conclusion

Abdominal radiologists can play an important role in alerting clinicians about the possibility of SARS-CoV-2 infection in patients with abdominal pain but otherwise not suspected to have COVID-19. Careful evaluation of the lung bases for the typical nodular, peripherally distributed ground-glass opacities may lead to the correct diagnosis before progressive respiratory manifestations. An early diagnosis is helpful not only in patient care but also in allowing health care workers to be prepared with the appropriate personal protective equipment. The fact that patients with COVID-19 can have primarily abdominal symptoms requires heightened awareness by all providers.

## Acknowledgments

We thank our families for their never-ending support and the health care workers on the front lines of the current pandemic.

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