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COVID-19 as a probable cause of acute pancreatic injury

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Abstract

Acute pancreatic pseudocysts are increasingly recognized as complications in patients with coronavirus disease 2019 (COVID-19). Therefore, it is important for healthcare providers to be aware of this phenomenon to ensure proper diagnosis and treatment. Up to 17% of patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection have been shown to develop pancreatic lesions. These pancreatic lesions can be caused directly by the cytopathic effects of the viral infection or indirectly by systemic responses to inflammation or respiratory failure. Several studies have shown that angiotensin-converting enzyme 2 (ACE2) is the functional receptor used by SARS-CoV-2 to gain access to target cells, while ACE2 receptors are expressed in significant amounts in the pancreas. In this article, we present 2 cases of COVID-19 patients that presented with similar pancreatic lesions. The first case was a 47-year-old lady who presented to the emergency department (ED) with flu-like symptoms for ten days. Incidental findings on computed tomography (CT) scan showed a large, multiloculated cystic mass in the pancreatic tail. The second case was an 81-year-old Caucasian lady who presented to the outpatient clinic with multiple chronic complaints after an acute COVID-19 infection four months prior. Abdominal CT scan with oral contrast revealed multiple hypodense masses on the pancreas measuring 0.3 cm in diameter. The cases we reported in this article showed the degree of COVID-19's effect on the gastrointestinal system, with pancreatic injury occurring during the early phases of the acute phase of the infection and lasting up to 4 months post-resolution of the infection.

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Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for coronavirus disease 2019 (COVID-19), has been demonstrated to have multisystemic effects on individuals who contract the disease. The primary mode of SARS-CoV-2 infection is via the respiratory tract. However, studies have also indicated that the virus can replicate in the gastrointestinal (GI) tract. (1) Digestive symptoms have been reported in COVID-19 patients ever since the early days of the pandemic, and it is believed that these symptoms may be associated with the high expression of angiotensin-converting enzyme 2 (ACE2) receptors. (1-3) Several studies have shown that ACE2 is the functional receptor used by SARS-CoV-2 to gain access to target cells.

(1,4,5) Reports have also demonstrated that ACE2 receptors are expressed significantly in the pancreas, elevating the probability of COVID-19-induced pancreatitis. (6) The exact mechanism by which SARS-CoV-2 reaches the gastrointestinal tract is not fully understood. However, it is known that there is bidirectional communication between the lung and gastrointestinal tract, known as the lung-gut axis, where a change in one organ may affect the other. (7,8) In this article, we document two cases of acute pancreatic lesions in COVID-19 patients seeking medical care in an in-patient and outpatient setting.

Case 1

A 47-year-old Hispanic lady with a history of type 2 diabetes mellitus presented to the emergency department (ED) complaining of shortness of breath, sore throat, and cough for ten days. Upon presenting to the ED, her oxygen saturation was 80% on room air. The patient was not vaccinated for COVID-19, and the rapid polymerase chain reaction (PCR) test returned positive for the virus. The patient had no significant surgical history and denied tobacco smoking, drinking alcohol, or using illicit drugs. Chest computed tomography (CT) scan without contrast on admission showed diffuse ground glass opacities, and confluent infiltrates consistent with COVID-19 (**Figure 1**), as well as an incidental finding of a pancreatic mass (**Figure 2**) that prompted an abdominal CT scan with contrast for further investigation. Abdominal CT with contrast showed a large, multiloculated cystic mass on the pancreatic tail measuring 4.1 x 4.3 x 3.5 cm (**Figure 3**). **Table 1** shows the results of the laboratory examination. No pancreas or GI tract symptoms were observed during the patient's hospitalization. The patient did not report any history of such symptoms before hospitalization. The patient was discharged from the hospital ten days later with home oxygen, and upon follow-up in the outpatient clinic, the patient showed normal recovery of the respiratory symptoms. Furthermore, subsequent abdominal CT scans showed complete resolution of the pancreatic cystic mass.

Case 2

An 81-year-old Caucasian lady presented to the outpatient clinic for a follow-up regarding her post-COVID-19 symptom status. She tested positive for COVID-19 four months before her visit and currently complained of fecal incontinence and loss of appetite. In addition, the patient reported dizziness, weakness, chills, cold intolerance, and a history of dysrhythmia and syncope during the acute phase of COVID-19. Chest CT showed clear bilateral lungs with minimal scarring caused by the previous COVID-19 infection (**Figure 4**). An abdominal CT scan with oral contrast showed multiple hypodense masses on the pancreas measuring 0.3 cm in diameter (**Figure 5**). **Table 1** shows the results of the laboratory examination. The patient never complained of GI symptoms during the acute phase of COVID-19. The patient refused further examination of her pancreas and elected not to receive any treatment.

Discussion

Pancreatic pseudocysts occurring in patients with COVID-19 have been documented in the past. (9-13) The expression of ACE2 receptors in the pancreas raises the possibility of COVID-19-induced acute pancreatitis without any known risk factors. Wang and collaborators found that the incidence of pancreatic injury was 17% in patients with COVID-19 pneumonia. (14) In this article we report two cases of pancreatic injury in COVID-19 patients, one occurring during the acute phase and the other at four months post-resolution of the acute phase. In both reported cases, a pre-existing history of pancreatic injury was not present, which renders the determination of the timeline of pancreatic lesion development after SARS-CoV-2 infection of great importance has no history of pancreatic injury. The pancreatic injury in COVID-19 patients might be caused directly by the cytopathic effects mediated by the viral infection or indirectly by systemic responses to inflammation or respiratory failure. In the first case, we report an incidental finding of a multi-cystic pancreatic mass on admission. Even though the patient had no history or complaints of previous GI conditions, multi-cystic lesions developed on the tail of the pancreas. The case was of particular significance due to the absence of pancreatic ductal dilation observed on the CT scan, which could suggest that the injury was a result of direct cytopathic effects caused by the virus rather than the inflammation of the pancreatic ducts causing the accumulation of exocrine substances and the formation of cysts. In the second case, multiple masses on the pancreas were found after recovering from COVID-19. Even though the patient had elevated pancreatic markers, the lesions on the pancreas were more significant in number and smaller in size than the lesions of the first case. These lesions could be remnants of a previous pancreatic injury during the acute phase of the infection. It is noteworthy that the pancreatic markers in this patient remained elevated four months after the resolution of the acute phase of COVID-19. This observation could potentially

serve as an indication of persistent pancreatic inflammation. Indeed, studies have found the presence of COVID-19 proteins for up to 30 days post-infection. (15)

Conclusions

It is possible that the COVID-19 infection triggered the pancreatic injury seen in our patients. However, the cases depict the extent of the effects of COVID-19 on the GI system, with pancreatic injury occurring during the early phases of the acute phase of the infection and lasting up to 4 months post-resolution.

Conflicts of interest

The authors have no conflict of interest in the preparation of this manuscript. This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Table 1. The results of the laboratory examination

	Case 1	Case 2	Normal range
Lipase (U/l)	27	-	0-160
CA 19-9 (U/ml)	72	57	<34
CEA (ng/ml)	6.5	1.9	<2.5 (non-smoker)
CA 125 (U/ml)	24	8	<35
ESR (mm/h)	2	11	≤20
Total bilirubin (mg/dl)	0.6	1.5	0.2-1.2
Direct bilirubin (mg/dl)	0.1	0.2	≤0.2

Legend: CA 19-9=cancer antigen 19-9; CEA=carcinoembryonic antigen; CA 125=cancer antigen 125; ESR=erythrocyte sedimentation rate.

Figure 1. Chest axial computed tomography shows extensive ground glass infiltrates throughout both lungs, consistent with COVID-19 pneumonia

Legend: COVID-19=coronavirus disease 2019.

Figure 2. Abdominal axial computed tomography shows an edematous pancreas with a large mass on the pancreatic tail

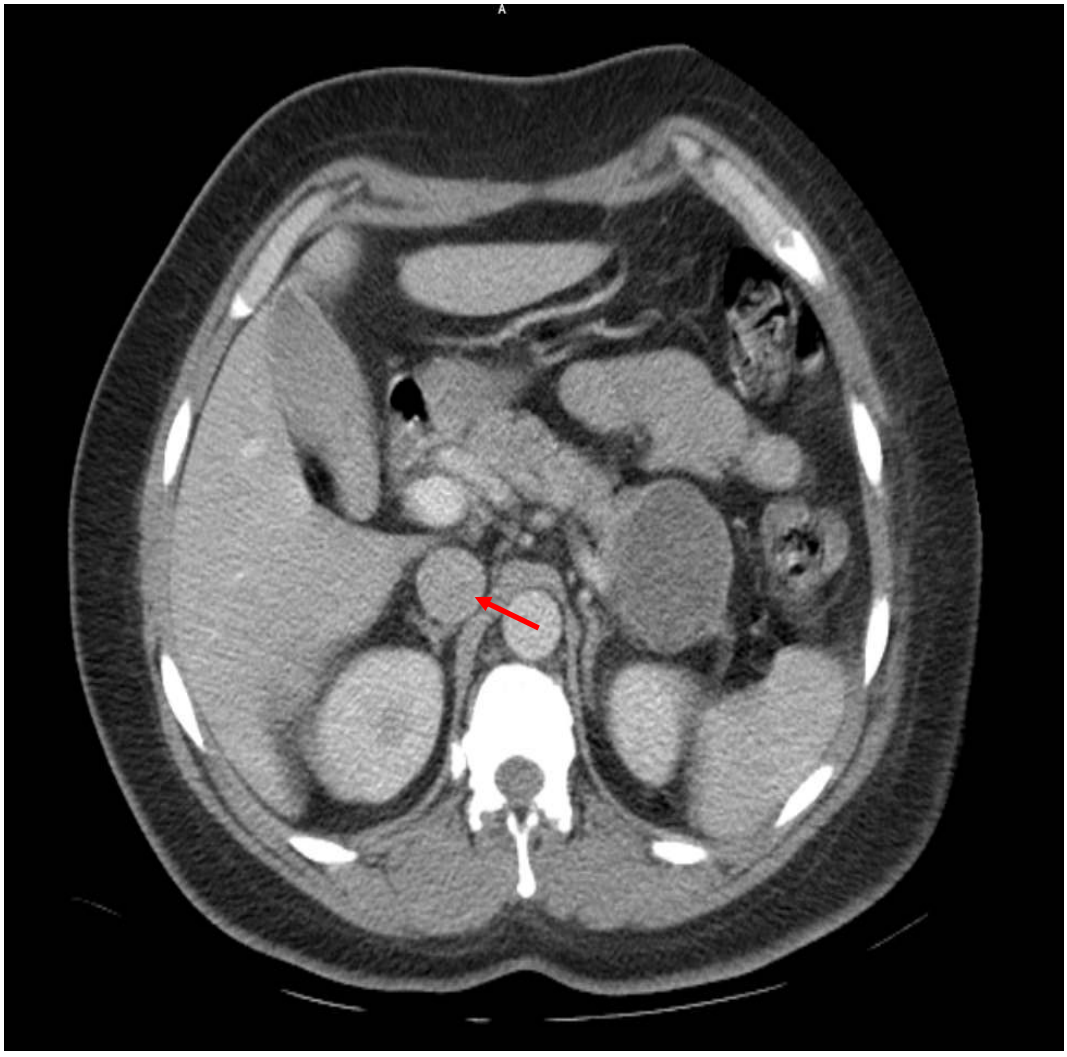

Figure 3. Abdominal coronal computer tomography shows a large multi-cystic mass on the pancreas

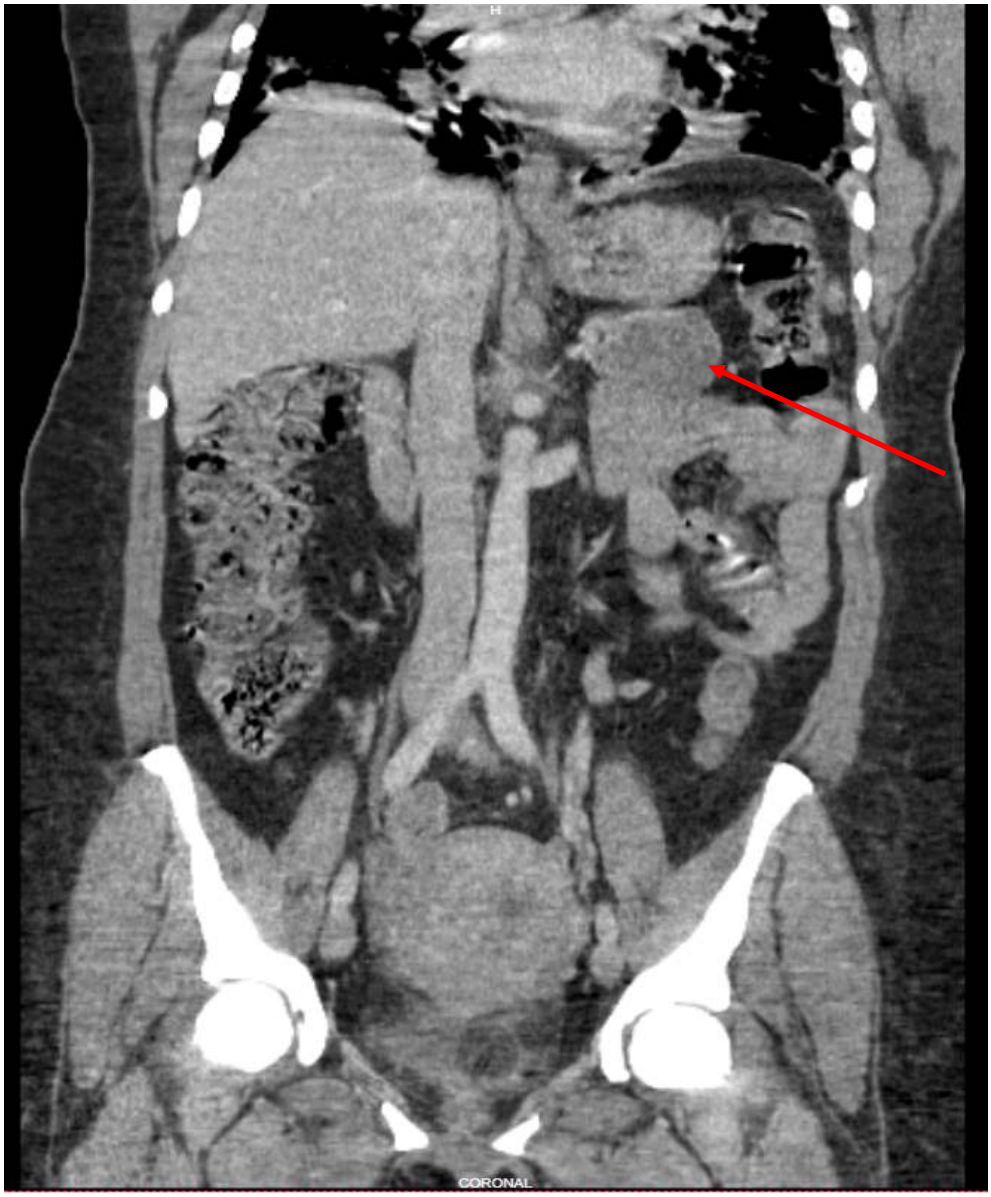

Figure 4. Chest axial computed tomography shows clear bilateral lungs with some bronchiectasis and pulmonary hypertension

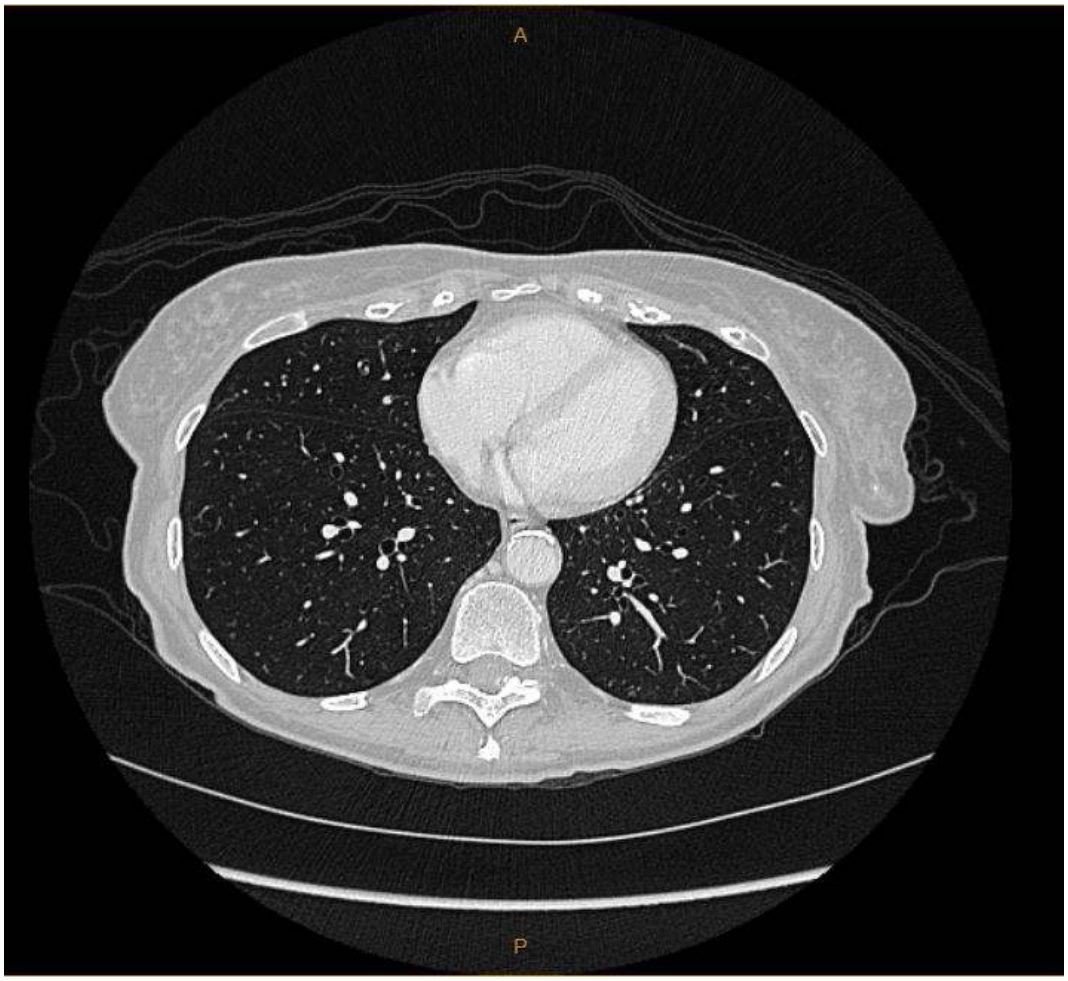

Figure 5. Abdominal axial computed tomography shows multiple pancreatic masses

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