Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Pancreatology 20 (2020) 1013–1014

Contents lists available at ScienceDirect

Pancreatology

journal homepage: www.elsevier.com/locate/pan

Current evidence on pancreatic involvement in SARS-CoV-2 infection

Global outbreak of COVID-19 was declared pandemic by the World Health Organization with currently more than four million infected patients. Diverse clinical manifestations other than respiratory symptoms were reported in COVID-19 patients. Unfortunately, pancreatic manifestation was rarely described. SARS-CoV-2, the infectious agent of COVID-19, attached to angiotensin-converting enzyme 2 (ACE2) on the cell surface which acts as a receptor for viral entry into host cells [1]. ACE2 was expressed in cells of various organs including pancreatic cells in both exocrine glands and islets which expression was even higher than pulmonary cells [2]. Hence, the pancreatic cell might be a potential target cell for SARS-CoV-2.

Viral infection was described as one of possible etiologies for acute pancreatitis with reported cases occurring due to hepatitis viruses, herpesviruses and coxsackieviruses [3]. Interestingly, abdominal pain was reported as one of gastrointestinal symptoms presenting in COVID-19 patients [4]. However, further investigation to diagnose acute pancreatitis was rarely performed and underreported. The diagnosis of acute pancreatitis requires at least two of three features: (1) acute abdominal pain compatible with acute pancreatitis; (2) serum lipase or amylase more than three times of upper limit of normal; (3) imaging evidence of acute pancreatitis [5]. Chinese case series reported 9 patients with mild elevation of pancreatic enzymes less than triple of upper limit of normal which does not reach the cut-point for diagnosis and did not provide other supported evidence to fulfill the criteria of diagnosing acute pancreatitis such as characteristics of abdominal pain or imaging findings [6]. Nevertheless, two Danish COVID-19 critical patients with multi-organ failure were diagnosed with acute pancreatitis by elevation of serum amylase with typical abdominal pain or imaging evidence which other etiologies of acute pancreatitis were excluded [7]. Another COVID-19 critical case in the US presented with epigastric pain and elevated pancreatic enzyme with unremarkable pancreatic imaging was also diagnosed with acute pancreatitis without other risk factors [8]. Acute pancreatitis in severe COVID-19 patients may result from direct attack of SARS-CoV-2 to pancreatic acinar cells or uncontrollable systemic inflammatory response from cytokine storm syndrome leading to multi-organ dysfunction including pancreatic injury. Moreover, several conditions in severe patients such as mechanical ventilation or shock resulting in hypoperfusion can also develop acute pancreatitis as a complication [9]. Thus, etiology of acute pancreatitis in COVID-19 patients should be carefully investigated.

Another essential role of pancreas is regulation of blood glucose by cells in pancreatic islets. ACE2 immunostaining in pancreatic tissue found that ACE2 are presented in islet cells more than exocrine cells [10]. Glycemic characteristic study of 1122 hospitalized COVID-19 patients reported that 257 patients had uncontrolled hyperglycemia which defined as two or more capillary blood glucose tests greater than 180 mg/dl with A1C < 6.5% or no A1C testing [11]. Although the reported “uncontrolled hyperglycemia” group may include undiagnosed diabetes in patients without A1C data or newly developed diabetes which still had normal A1C, it might represent a group of patients with diabetes as a complication from viral infection in islet cells. Unfortunately, there is no current clinical evidence of SARS-CoV-2-induced diabetes. Previous study during severe acute respiratory syndrome (SARS) outbreak could provide an interesting hint since SARS-CoV was reported to entry cells via ACE2 which is exactly the same as SARS-CoV-2 [12]. 39 SARS patients without diabetes history and steroid treatment developed hyperglycemia during hospitalization and no significant increase of blood glucose was found between pre-admission and discharge with 20 patients diagnosed with diabetes after two weeks of admission, reduced to six patients during discharge and three patients after 3-year follow up [10]. Although SARS-CoV and SARS-CoV-2 infection were suspected as an etiology of observed transient hyperglycemia, another possible explanation is stress hyperglycemia during illness which can be presented in hospitalized patients.

Current pancreatic pathological reports from autopsy of COVID-19 deceased patients are still insubstantial. Samples of pancreas from three patients who died from COVID-19 revealed that there were no obvious abnormalities in exocrine cells with small number of islet cell degeneration and no SARS-CoV-2 detected in pancreatic tissue [13]. In contrast, an autopsy report from four SARS patients found that SARS-CoV, which is also attached to ACE2 for cellular entry, was detected in the majority of pancreatic samples [14]. Therefore, further autopsy of COVID-19 cases are still required to provide histological evidence of SARS-CoV-2 infection in pancreatic cells. In conclusion, current evidence of pancreatic manifestation in COVID-19 patients is limited which further investigation is essential to unravel consequences of SARS-CoV-2 infection on both endocrine and exocrine pancreas.

Financial support

None.

Declaration of competing interest

None.

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17 May 2020
Available online 27 May 2020