

CASE REPORT

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Acute pancreatitis occurring after COVID-19 vaccine: a case report and literature review

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Abstract

Background Vaccines are uncommon causes of pancreatitis, and only a few case reports have described COVID-19 vaccine-related pancreatitis.

Case presentation A 45-year-old male patient applied to the emergency department due to having serious abdominal pain. Pfizer-BioNTech COVID-19 vaccine, the last dose was administered 1 week ago. One week after vaccination, he experienced abdominal pain. Laboratory tests demonstrated elevated C-reactive protein, amylase, and lipase levels, and Ig G4 levels were normal. Abdominal computer tomography (CT) displayed acute edematous pancreatitis and peripancreatic inflammatory changes. The patient was diagnosed with acute pancreatitis due to the vaccine.

Conclusion We should be aware that acute pancreatitis induced by the vaccine may occur a few days or weeks after the vaccine, especially in patients who have risk factors for acute pancreatitis.

Introduction

Acute pancreatitis is an acute inflammatory disease of the pancreas, existing with severe acute upper abdominal pain, manifesting with vomiting, nausea, and fever [1]. COVID-19 vaccines, including mRNA-based, protein subunit, and inactivated vaccines, have played a critical role in mitigating the pandemic. The Pfizer-BioNTech COVID-19 vaccine, with a reported efficacy of 95%, has been widely administered [2]. Common adverse effects include fatigue, headache, flu-like symptoms, joint pain, and fever, while rare but severe reactions such as myocarditis and pericarditis have been documented [3]. Vaccines are uncommon causes of pancreatitis, and only a few case reports have described COVID-19 vaccine-related pancreatitis [4, 5]. This report presents a case of acute pancreatitis occurring after the Pfizer-BioNTech COVID-19 vaccine.

Case presentation

A 45-year-old male patient applied to the emergency department at Ege University in 2022 due to having serious abdominal pain. His medical history included diabetes mellitus, familial hypertriglyceridemia, coronary artery disease, and a prior episode of lipemic pancreatitis 2 months ago and his weight was 75 kg. He had alcohol consumption 4–5 times per week—1–2 beers—until 2 months ago. He was on medication with fenofibrate, omega-3, and insulin, he was taking a low-fat diet. He had received three doses of the Pfizer-BioNTech COVID-19 vaccine, the last dose was administered 1 week ago. One week after vaccination, he experienced abdominal pain. On physical examination, blood pressure, heart rate, and body temperature were normal. Tenderness was detected in the abdomen. Vomiting and diarrhea were absent. Laboratory tests demonstrated elevated C-reactive protein, amylase, and lipase levels, and Ig G4 levels were normal (Table 1). Abdominal ultrasonography (USG) revealed no gallstones. Abdominal computer tomography (CT) displayed acute edematous pancreatitis and peripancreatic inflammatory changes. Pancreatic edema was demonstrated in Fig. 1. The patient was diagnosed with acute pancreatitis according to the American

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Table 1 Laboratory tests

Laboratory findings	Before treatment	After treatment	Reference range
Hemoglobin (g/L)	14	13.9	13.1–17.2
White blood cell ($10^3/\mu\text{L}$)	15.99	8.49	4.5–11.0
Neutrophil ($10^3/\mu\text{L}$)	12.2	4.32	1.51–7.07
Thrombocyte ($10^3/\mu\text{L}$)	349	411	150–450
AST (U/L)	17	24	<35
ALT (U/L)	25	36	<45
ALP (U/L)	93	112	40–129
GGT (U/L)	71	90	<55
Total bilirubin/direct bilirubin (mg/dL)	0.22/0.1	0.45/0.19	0.1–1/<0.25
Calcium ((mg/dL)	9.9	9.4	8.6–10.2
Serum amylase (U/L)	1145	118	28–100
Serum lipase (U/L)	3956.5	144	<60
HDL (mg/dL)	23	25	>40
LDL (mg/dL)	87	104	<130
Trygliceride (mg/dL)	276	311	<150
Total cholesterol (mg/dL)	165	181	<200

College of Gastroenterology Guideline (at least 2 out classification criteria must be met, typical abdominal pain, serum amylase or lipase levels $>3\times$ upper limit or normal, characteristic CT and /or MRI scan findings) [6]. The patient was treated with the administration of intravenous fluid hydration and proton pump inhibitors. After 1 week of hospitalization, his amylase levels decreased to the normal range, and a follow-up CT scan revealed the absence of necrosis and a decrease in the enlargement of the pancreas. She was discharged 3 weeks after hospitalization.

Discussion

We described a case of acute pancreatitis after the third administration of the Pfizer-BioNTech COVID-19 vaccine. There were multiple risk factors to develop pancreatitis for our patients such as hypertriglyceridemia and alcohol consumption history; however, we excluded them. When serum triglyceride levels are above >500 mg/dl (>5.6 mmol/L), there is a high risk of developing pancreatitis [7]. In our case, triglyceride level was detected at 276 mg/dL, we excluded lipemic pancreatitis. In addition, he had stopped taking alcohol 2 months ago, so alcohol consumption was excluded. The initiation of symptoms 1 week after the vaccine might indicate that the potential cause of pancreatitis was the administration of the COVID-19 vaccine.

To the best of our knowledge, there were six case reports about COVID-19 vaccine-related pancreatitis in the literature, apart from our case (Table 2) [4, 8–12]. Among them, one case developed pancreatitis as our case 1 week later after the administration of the vaccine

**Fig. 1** Contrast-enhanced CT demonstrated pancreatic edema

and she had systemic lupus erythematosus and was diagnosed with autoimmune pancreatitis [10]. Walter et al. [4] reported a case with necrotizing pancreatitis 6 h after the second dose of vaccine. One patient was a breastfeeding woman and 12 h after the first dose induced pancreatitis [8]. In addition, Parkash et al. [9] reported a 96-year-old elderly patient developed pancreatitis a few days after the first dose of the vaccine.

The Pfizer-BioNTech COVID-19 vaccine, based on mRNA technology targeting the SARS-CoV-2 spike protein, has known systemic and local adverse effects [2]. Regarding Pfizer's data, one obstructive pancreatitis and one case of pancreatitis adverse reaction were detected in the phase 2/3 clinical trial of the COVID-19 mRNA vaccine [8]. As aforementioned, the COVID-19 vaccine was demonstrated to be a possible cause of acute pancreatitis.

Table 2 Case reports about COVID-19 vaccine-related pancreatitis

Author and journal	Age	Sex	Vaccine Type	Dose and elapsed time after vaccination	Pancreatic enzyme levels	Imaging	Patient history	Alcohol consumption	Family history
Walter et al. [4]	43	M	Pfizer-BioNTech COVID-19	6 h after the second dose	Lipase: 23 750 U/L	Necrotizing pancreatitis with collections	Pancreatitis attack once 10 years ago	Six standard units per week	No pancreatitis history
Cieśliewicz et al. [8]	29	F	Pfizer-BioNTech COVID-19	12 h after first dose	Amylase: 51 U/L	MRI indicates pancreatic injury	Healthy, breastfeeding woman	No alcohol consumption	No pancreatitis history
Parkash et al. [9]	96	F	Pfizer-BioNTech COVID-19	Few days after the first dose	Lipase: 4036 U/L	No finding	Diastolic heart failure, hypertension, hypothyroidism	No alcohol for 10 years	Unknown
Mousa N et al. [10]	22	F	Pfizer-BioNTech COVID-19	One week after the first dose	Amylase, 181 U/L, normal range 30–110 U/L; lipase, 185 U/L, normal range 10–140	Slightly bulky pancreas with a loss of normal lobulation, which is suggestive of autoimmune pancreatitis	Systemic lupus erythematosus	No alcohol consumption	No pancreatitis history
Kantar et al. [11]	17	M	Pfizer-BioNTech COVID-19	12 h after first dose	Lipase at 1535 U/L and amylase at 161 U/L	Magnetic resonance imaging (MRI) demonstrated pancreatic enlargement and increased intensity due to edema with inflammation surrounding the pancreas	Healthy	No alcohol consumption	His father has type I diabetes
Ozaka et al. [12]	71	F	Pfizer-BioNTech COVID-19	2 days after the first dose	Amylase, 1043 IU/L, lipase,	CT: diffuse enlargement of the pancreas with ill-defined parenchymal contours	Hypertension, hyperlipidemia, and cerebral infarction	No alcohol consumption	No family history
Current case	45	M	Pfizer-BioNTech COVID-19	One week after the third dose	Amylase: 1145 U/L, lipase: 3956.5 U/L	Necrotizing pancreatitis	Familial hypertriglyceridemia once	He had alcohol consumption 4–5 times per	His father, mother, and sister also have familial hypertriglyceridemia. Her sister had a pancreatitis attack about 10 years ago

The mechanism related to vaccine-induced pancreatitis remains uncertain. The mechanism may resemble COVID-19 disease. COVID-19 virus can use transmembrane serine protease 2 (TMPRSS2) at the beginning of the disease [13]. SARS-CoV 2's spike protein makes an attachment to the host's angiotensin-converting enzyme-2 (ACE-2) receptor and a virus is able to enter the human cell [8]. ACE-2 and TMPRSS2 are also secreted in the gastrointestinal duct, pancreatic duct, and acinar cells. The virus might transport itself from duodenal cells to the pancreatic duct and islet cells, thus it could initiate an inflammatory process in the pancreas [14]. On the other hand, the COVID-19 vaccine may cause hypertriglyceridemia and this condition may induce pancreatitis [15].

In conclusion, we should keep in mind that COVID-19 vaccines are the best way to protect from morbidity and mortality due to COVID-19. However, we should be aware that acute pancreatitis induced by the vaccine may occur a few days or weeks after the vaccine, especially in patients who have risk factors for acute pancreatitis. It may be useful to choose the type of vaccine for high-risk groups.

Abbreviations

TMPRSS2 Transmembrane serine protease 2
ACE-2 Angiotensin converting enzyme-2

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Authors' contributions

CK and HO contributed to the data collection. CK and HO participated in the writing of the manuscript. GUK, BSY, and ME participated in the critical review. CK, HO, GUK, BSY, and ME provided approval for the final manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

Oral and written informed consent were obtained from the patient.

Consent for publication

Will be made available on request.

Competing interests

The authors declare that they have no competing interests.

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