

A Rare Case of Pancreatitis-Induced Thrombosis of the Aorta and Superior Mesenteric Artery

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ABSTRACT: It is estimated that there are more than 210,000 hospital admissions for acute pancreatitis and more than 56,000 admissions for chronic pancreatitis each year in the United States. Pancreatitis comes with numerous complications that can increase morbidity, mortality, and length of hospital stay. Local and systemic complications include pseudocysts, necrosis, sepsis, multiorgan failure, and vascular complications. Thrombosis of the splanchnic venous system occurs in approximately 2% of patients with pancreatitis, but thrombosis is rarely seen in the arterial system. In this report, we describe a case of thrombosis of the abdominal aorta and superior mesenteric artery in a female patient who presented with acute pancreatitis.

CASE DESCRIPTION

A 60-year-old woman with a past medical history of hypertension, type 2 diabetes mellitus, and spinal stenosis was brought to the emergency department due to altered mental status. On physical examination, the patient was afebrile and her heart rate and blood pressure were 103 bpm and 126/60 mm Hg, respectively. She was alert and oriented only to self. The examination was otherwise unremarkable. Laboratory tests revealed a white blood cell count of 21,000/mm³, hyperglycemia with blood glucose > 1,000 mg/dL, anion gap of 42 mEq/L, hypokalemia of 2.7 mEq/L, HCO₃ of 7 mEq/L, creatinine of 2.14 mg/dL, and a lipase level of 6,000 IU/L. The chest x-ray was within normal limits, and an electrocardiogram showed sinus tachycardia.

The patient was admitted to the medical intensive care unit, where she was treated for diabetic ketoacidosis with intravenous fluids, continuous insulin infusion, broad-spectrum antibiotics, and electrolyte replacement therapy. After 4 days, her diabetic ketoacidosis and encephalopathy resolved, and her pancreatitis significantly improved. However, she developed a fever, which prompted an abdominal/pelvic computed tomography (CT) scan. The scan revealed peripancreatic fat stranding and edema at the head and neck of the pancreas, suggestive of acute pancreatitis, and thrombi at the abdominal aorta, the superior mesenteric artery, and the splenic vein (Figures 1–3). Transthoracic echocardiography with bubble study was negative for thrombus and patent foramen ovale. Coagulation studies (including factor V Leiden, homocysteine, anticardiolipin antibodies, and lupus anticoagulant) were negative for prothrombotic conditions. Anticoagulation therapy was started with a heparin drip and subsequently switched to warfarin.

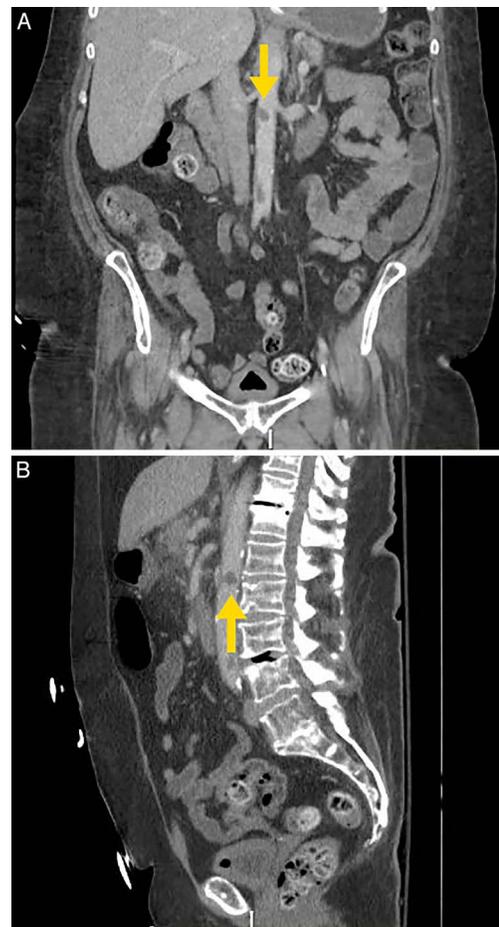


Figure 1. (A) Abdominal and (B) pelvic computed tomography scans revealing abdominal aortic thrombosis (arrows).

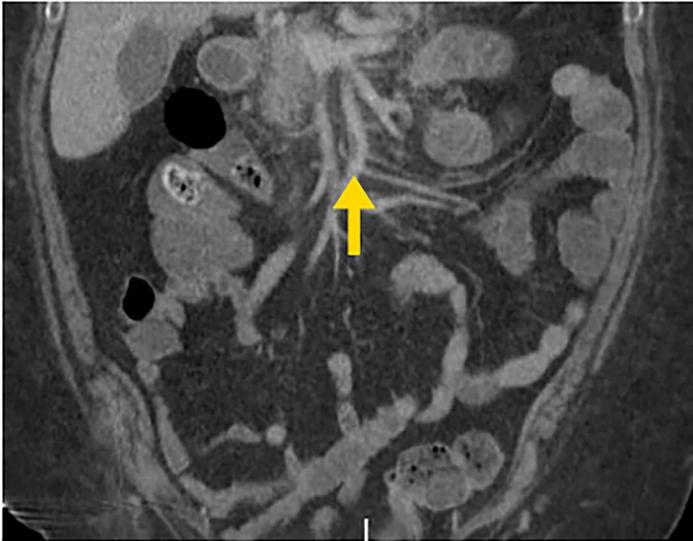


Figure 2.

Abdominal/pelvic computed tomography scan showing thrombosis in the superior mesenteric artery.

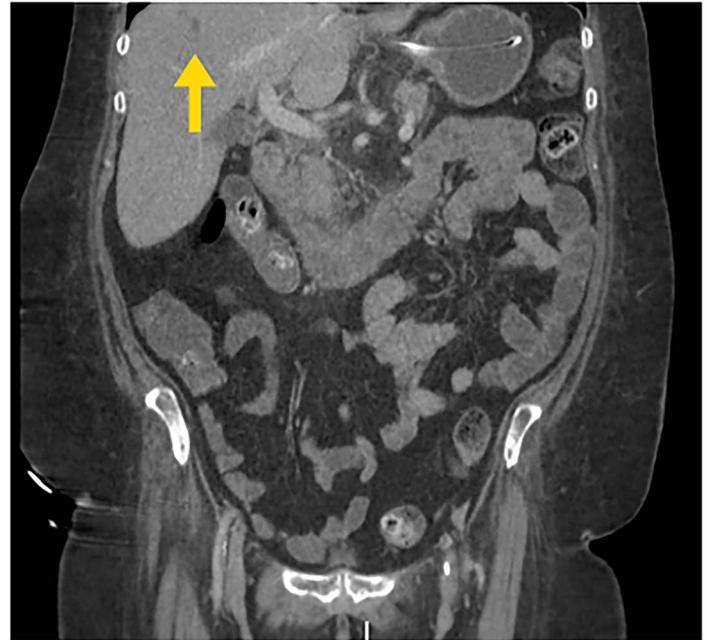


Figure 3.

Abdominal computed tomography scan identifying hypodensities in liver consistent with hepatic microinfarcts 3 weeks after initial presentation.

The patient improved progressively and was transferred to the medical floor. A CT scan performed 20 days later revealed a stable projecting atheromatous plaque extending from the renal artery level to the aortic bifurcation and two new hepatic wedge-shaped hypodensities consistent with microinfarcts (Figure 3). Otherwise, she remained stable and was discharged without further complications.

DISCUSSION

It is estimated that there are more than 210,000 hospital admissions for acute pancreatitis each year in the United States.¹ Vascular complications of acute pancreatitis have been most commonly associated with alcohol-induced, necrotizing, and chronic pancreatitis.² These complications typically include hemorrhages, formation of pseudoaneurysms, and splenic vein thrombosis. A recent study showed that porto-spleno-mesenteric vein thrombosis was seen in 17% of patients during the early stage of acute pancreatitis.³ However, the accuracy of the diagnosis depends on the imaging study performed. In a series, only 68% of the cases of portal thrombosis and 32% of collaterals were evidenced on CT.⁴ On the other hand, thrombosis of the aorta and its branches secondary to acute pancreatitis is extremely rare, with few cases reported in the literature. Arterial thrombosis usually develops after the rupture of an atheromatous plaque.⁵ Nevertheless, in the setting of acute pancreatitis, there are multiple microcirculatory changes that tilt the hemostatic balance toward clot formation. Elevated levels of fibrinogen

and D-dimer have been found in patients with pancreatitis.⁶ The release of proteolytic and lipolytic enzymes into the bloodstream causes disruption of the vessel wall and activates coagulation factors and platelets. Moreover, local inflammation, pressure necrosis, mass effect, and hypovolemia together induce vascular stasis and vasospasm, creating a prothrombotic environment.⁷

Our patient presented with diabetic ketoacidosis, which could have contributed to the development of multiple thromboses. Decreased levels of protein C and protein S and increased levels of von Willebrand factor and homocysteine—all thrombotic risk factors—have been reported in patients with diabetic ketoacidosis. Interestingly, diabetic ketoacidosis is associated with more cases of arterial than venous thrombosis.⁸

Few cases of arterial thrombosis secondary to acute pancreatitis have been reported; in those that have, the thrombus primarily affects the vessels adjacent to the pancreas (abdominal aorta and its branches).^{9,10} Even rarer are cases of widespread, distant thrombosis of the thoracic aorta, carotids, or intracardiac thrombi.¹¹ Superior mesenteric occlusive thrombosis can cause ischemia from the proximal jejunum to the mid-transverse colon. However, our patient showed no signs of ischemia in the CT scan. In contrast, hepatic microinfarcts were seen 3 weeks after the initial presentation. It is important to

highlight that hepatic infarction is rare because of the liver's dual blood supply.

SUMMARY

We described a case of thrombosis of the abdominal aorta and superior mesenteric artery in a patient who presented with acute pancreatitis and diabetic ketoacidosis. The patient was successfully treated with anticoagulation without further complications. Arterial and venous thrombosis in acute pancreatitis are associated with poor prognosis, but there is no correlation between the severity of pancreatitis and the incidence of thrombotic events. Thus, we believe that early recognition and investigation of vascular complications are crucial because both conditions can increase morbidity and mortality.

Conflict of Interest Disclosure:

The authors have completed and submitted the *Methodist DeBakey Cardiovascular Journal* Conflict of Interest Statement and none were reported.

Keywords:

pancreatitis, thrombosis, aorta, superior mesenteric artery

REFERENCES

1. Affronti J. Chronic pancreatitis and exocrine insufficiency. *Prim Care*. 2011 Sep;38(3):515-37.
2. Evans RP, Mourad MM, Pall G, Fisher SG, Bramhall SR. Pancreatitis: Preventing catastrophic hemorrhage. *World J Gastroenterol*. 2017 Aug 14;23(30):5460-8.
3. Ling D, Feng D, Chen Y, et al. Portosplenomesenteric vein thrombosis in patient with early-stage severe acute pancreatitis. *World J Gastroenterol*. 2018 Sep;24(35):4054-60.
4. Dorffel Y, Wruck U, Ruckert RI, Romaniuk P, Dorffel W, Wermke W. Vascular complications in acute pancreatitis assessed by color duplex ultrasonography. *Pancreas*. 2000;21(2):126-33.
5. Verbeeck N, Cavez N, Plawny L, Weber J, Lens V. Primary aortic thrombosis: role of enhanced multislice CT demonstrated in three exceptional cases. *JBR-BTR*. 2014 Mar-Apr;97(2):76-80.
6. Cuthbertson CM, Cristophi C. Disturbances of microcirculation in acute pancreatitis. *Br J Surg*. 2006 May;93(5):518-30.
7. Mallick IH, Winslet MC. Vascular Complications of Acute Pancreatitis. *JOP*. 2004 Sep 10;5(5):328-37.
8. Cherian SV, Khara L, Das S, Hamarneh WA, Garcha AS, Frechette V. Diabetic ketoacidosis complicated by generalized venous thrombosis: a case report and review. *Blood Coag Fibrinolysis*. 2012 Apr;23(3):238-40.
9. Chong BK, Yun JK, Kim JB, Park DH. Multiple Ascending Aortic Mural Thrombi and Acute Necrotizing Mediastinitis Secondary to Acute Pancreatitis. *Korean J Thorac Cardiovasc Surg*. 2016 Oct;49(5):401-4.
10. Mishreki AP, Bowles MJ. A case of widespread aortic thrombosis secondary to acute pancreatitis. *Ann R Coll Surg Engl*. 2011 May;93(4):e17-8.
11. Keskin M, Gümüşdağ A, Börklü EB, et al. An unexpected complication of acute pancreatitis: Intra-cardiac thrombus. *Am J Emerg Med*. 2017 May;35(5):801.