

Acute mesenteric ischemia in chronic pancreatitis secondary to pancreas divisum. A case report

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Case Report

General Surgery



Background:

Acute mesenteric ischemia represents a group of diseases which are characterized by an interruption of blood supply causing intestinal ischemia. If untreated, this process can progress to cause intestinal necrosis with significant morbidity and mortality for the patient. Although it represents an entity almost exclusive to older adults, there are case reports of young patients with risk factors for this entity that can lead to them developing this disease even at their young age. Among these risk factors are mainly coagulopathy, abdominal inflammatory processes, or cardiovascular factors such as arrhythmias or heart failure. Therefore, we present the case of a young patient with a history of chronic pancreatitis secondary to pancreas divisum who was admitted to the gastroenterology service of our hospital, initially suspecting that the pain was secondary to her pancreatic disorder, however it turned out to be a mesenteric ischemia with intestinal necrosis that required extensive intestinal resection.

Keywords: Acute mesenteric ischemia, chronic pancreatitis, pancreas divisum.

Chronic pancreatitis is one of the most important medical conditions in gastroenterology. It is defined as a progressive fibroinflammatory disorder, which is a result of irreversible structural changes with loss of lobular architecture of the pancreas, leading to dilatation of the pancreatic duct, with or without the presence of dystrophic calcification. Gastrointestinal complications of chronic pancreatitis are important and lead to significant morbidity and mortality. Diagnosis of these complications is difficult and may require a strong clinical suspicion coupled with various imaging features. Chronic pancreatitis eventually leads to exocrine and endocrine deficiency with recurrent episodes of abdominal pain. A wide variety of complications are associated with both acute and chronic pancreatitis. These complications may either be local or remote, acute or delayed, and abdominal or systemic¹. One of these complications may be, precisely, intestinal ischemia. When the mesenteric vessels are involved by an abdominal inflammatory process (in this case, chronic pancreatitis), blood supply to the involved bowel segment is impaired, leading to ischemia and finally necrosis. Imaging features of ischemia are indistinguishable from inflammation, showing mural thickening with stratification. The stage of necrosis may be characterized by thinning of bowel wall, with or without pneumoperitoneum as was the case of the patient reported in this case.

Case report

A 24-year-old female patient with a history of chronic pancreatitis secondary to pancreas divisum, already under follow-up by our service and being treated with pancreatin 2 tablets every 8 hours, was admitted to the emergency department due to a clinical picture characterized by generalized abdominal pain lasting 2 hours, intensity 6/10, in addition to nausea and general malaise, upon arrival at the emergency department she was treated with analgesia based on opioids and non-steroidal anti-inflammatory drugs, since an exacerbation of her chronic pancreatitis was initially suspected, which modified the condition since the patient presented a decrease in pain, subsequently admitted to the gastroenterology hospital service, on the floor laboratory measurements were carried out, among them stood out leukocytes of 18,000/mm, creatinine of 1.6 mg/dl, an amylase of 450 U/L, however, with a lipase value 144 U/L.

An arterial blood gas analysis was also performed in which a lactate value of 4 mmol/l was found, the rest of the laboratories were within normal ranges. The physical examination revealed the absence of peristalsis, and generalized abdominal pain. An urgent abdominal radiography identified edema of the intestinal wall in addition to double wall sign (Fig. 1). The patient was evaluated by the general surgery service who determined conservative management for the moment, however the patient presented worsening

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Figure 1 An abdominal x-ray was initially performed which shows significant intestinal dilation with wall edema, and double-wall sign.

abdominal pain, increasing to an intensity of 10/10, with an increase in lactate levels up to 6 mmol/l and leukocytes of 22,000/mm. Due to the above, an urgent simple abdominal tomography was performed (Fig. 2), where dilation of intestinal loops with wall edema and air-fluid levels was identified, in addition to abdominal free fluid. Therefore the patient underwent an emergency laparotomy, in which an extensive intestinal necrosis of 3.5 meters was described (Fig. 3), with only 90 cm of salvageable jejunum, in addition to drainage of 2000 cc of hemoperitoneum. Subsequently, the patient was discharged to the floor, during which she restarted oral diet after 5 days, with normalization of leukocytes and creatinine levels, she evolved favorably and was discharged 3 weeks after being admitted with the diagnosis of acute mesenteric ischemia, post-operative intestinal resection with jejunostomy and hemoperitoneum drainage.

Discussion

Acute mesenteric ischemia is caused by sudden interruption of blood supply to the intestine, leading to cellular damage, intestinal necrosis, and commonly patient death if untreated². Acute mesenteric ischemia may be occlusive or non-occlusive, with the primary etiology further defined as mesenteric arterial embolism, mesenteric arterial thrombosis, or mesenteric venous thrombosis³. The overall incidence is low (0.09–0.2% of all acute admissions to emergency departments), representing an infrequent cause of abdominal pain⁴, but a common cause of emergent intestinal resection. Prompt diagnosis and intervention are essential to reduce the mortality rates that exceed 50%⁵.

Based on its etiology, acute mesenteric ischemia can be caused by various type of pathology such as atrial fibrillation, myocardial infarction,

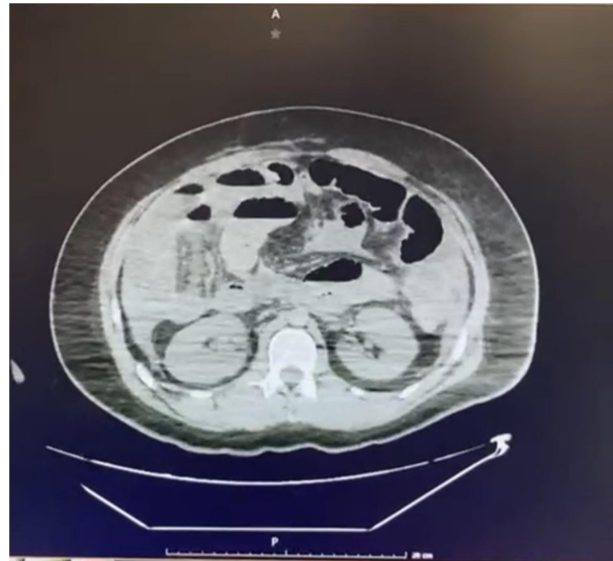


Figure 2. A CT scan was performed in which edema of the intestinal wall was observed, in addition to air-fluid levels and abdominal free fluid.

infective endocarditis, mechanical valve prostheses, cardiomyopathies, valvular disease or arterial embolism which represents 50% of cases, atherosclerosis, low cardiac output, congestive heart failure, procoagulative status, vasculitis, aortic/superior mesenteric artery aneurysm or dissection, cardiogenic shock, hypovolemic shock, septic shock, cardiac/major abdominal surgery, dialysis, or causes that increase intra-abdominal pressure like pneumoperitoneum during laparoscopic surgery or even pancreatitis.

The mesenteric arterial circulation comprises three principal branches of the abdominal aorta, namely, the celiac axis, superior mesenteric artery, and inferior mesenteric artery. The celiac axis supplies blood to the stomach, the first and second part of the duodenum, part of the pancreas, the liver, and the spleen. The superior mesenteric artery supplies blood to the remainder of the duodenum, jejunum, ileum, ascending colon, and the proximal third of the transverse colon. The inferior mesenteric artery delivers blood to the distal colon including the distal transverse, descending, and sigmoid colon and the proximal rectum. The superior mesenteric artery is the primary artery for the small intestine, with collateral supply from the celiac axis via the pancreaticoduodenal artery. An increase in the collateral circulation generally occurs when there is a stenosis of over 70% within the mesenteric arteries. The mesenteric blood flow accounts for about 15–20% of the cardiac output in the fasting state and up to 35% in the postprandial state. Following food intake, a surge in blood flow occurs within about 10–20 min, and its magnitude depends on the size and composition of the meal. Large, fatty meals cause the largest increase in blood flow. Apart from collaterals, the

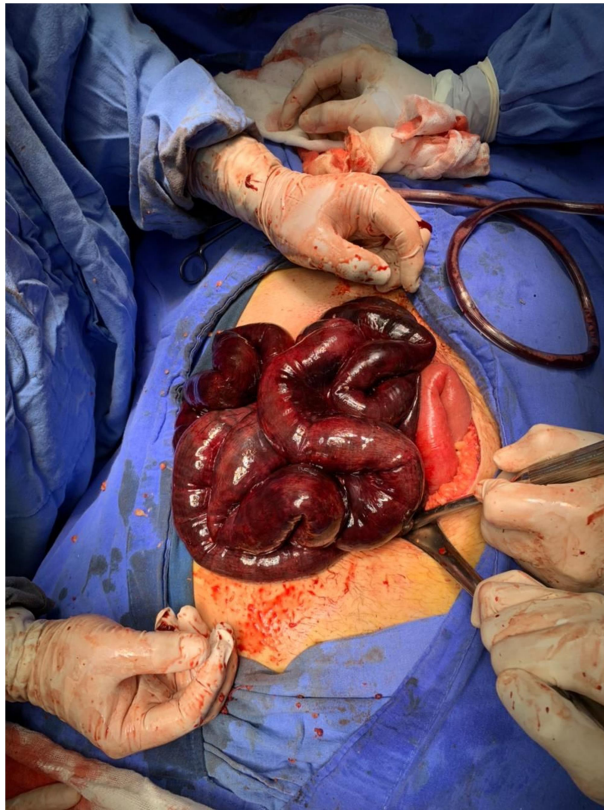


Figure 3. The surgical finding was reported as mesenteric ischemia of 3.5 meters with only 90 cm of salvageable jejunum.

mesenteric circulation is able to autoregulate blood supply through several complex mechanisms. As a result, the small intestine can tolerate up to a 75% reduction in overall blood flow for as long as 12 h; however, with complete occlusion, irreversible ischemia can occur in as short as 6 h. Acute mesenteric ischemia is a time-critical emergency resulting in irreversible hypoperfusion of the mesenteric organs within a few hours, leading to a high mortality rate. The large diameter and narrow take-off angle of the superior mesenteric artery contribute to its anatomical susceptibility to occlusion. Collateralization between the celiac and inferior mesenteric arteries protected against an acute occlusion of their main trunks. An acute complete circulatory interruption of the intestine leads to irreversible mucosal ischemia within 6 h⁶. The collapse of the mucosal barrier leads to bacterial translocation resulting peritonitis, ileus, sepsis, and multiorgan failure.

Symptoms and signs of mesenteric ischemia vary according to the etiology and the time of onset. They can be non-diagnostic or non-specific in almost 80% of cases. Abdominal pain is present in 95% of patients. Other symptoms are nausea (present in 44%), vomiting (present in 35%), diarrhea (present in 35%), heart rate > 100 (present in 33%), rectal bleeding (present in 16%), constipation (present in 7%)⁷. Laboratory studies are nonspecific. The most common

laboratory abnormalities are hemoconcentration, leukocytosis, and metabolic acidosis, with high anion gap and lactate concentrations⁸. High levels of serum amylase, aspartate aminotransferase, lactate dehydrogenase, and creatine phosphokinase are frequently observed at presentation, but none is sufficiently sensitive or specific to be diagnostic. Normal laboratory values do not exclude this diagnosis and do not justify delaying angiography when clinical suspicion exists. MDCT (multidetector CT) scan angiography is first line diagnostic images to discover acute intestinal ischemia with sensitivity 83%, specificity 93%, positive predictive value of 93%, negative predictive value of 61%. Findings on CT scan include: Mesenteric edema, bowel dilatation, bowel wall thickening, intramural gas, mesenteric stranding, portal vein gas, abdominal fluid⁸. Angiography is a diagnostic and therapeutic method and it is considered the gold standard for the diagnosis of acute mesenteric ischemia associated with MDCT scan. Its sensitivities in five of six studies have ranged between 90% and 100%; specificity was reported in two of these studies to be 100%. Although it has serious risks, angiography provides the possibility of direct infusion of vasodilators in the setting of non-occlusive ischemia⁹.

Diagnosis

Currently there are no serological tests that can detect acute mesenteric ischemia early in the disease course. The most common laboratory abnormalities described in the literature include neutrophilic leukocytosis, hemoconcentration, elevated lactic acid levels, anion gap metabolic acidosis, elevated serum levels of amylase, lactate dehydrogenase, and aspartate aminotransferase. Elevated lactic acid levels are associated with irreversible ischemia; however, it is neither sensitive nor specific. It is important to consider that lactic acid elevation can also be due to intravascular volume depletion and renal injury. Further, the liver can metabolize significant amounts of L-lactate and serum elevations are frequently not seen until late in the course when the ischemia has advanced to transmural infarction with very high associated mortality rates¹⁰. One should not rely on serum lactic acid levels, or any other serologic assessment alone to diagnose acute mesenteric ischemia or discriminate between early and irreversible disease. There have been many attempts to identify other serum markers for early acute mesenteric ischemia, but none with any success in clinical practice. Plain abdominal radiographs are not useful in diagnosing acute mesenteric ischemia, unless there is concern for a perforation and free air under the diaphragm. Duplex ultrasound is also not a helpful test when acute ischemia is suspected because it is highly

operator dependent, may not be available at all times, and has poor sensitivity. The diagnostic study of choice for acute mesenteric ischemia is computed tomography angiogram (CTA), also known as biphasic multidetector computed tomography, with a sensitivity of 85–98% and specificity of 91–100% for the diagnosis. This test is fast and does not require oral contrast which is generally not tolerated in those with suspected acute mesenteric ischemia. For occlusive processes (like embolic or thrombotic for example), CTA can directly visualize the obstruction. In non-occlusive mesenteric ischemia, there is no frank obstruction, and the diagnosis is supported by four findings: narrowing of the origin of the superior mesenteric artery, irregularities of the intestinal branches of the superior mesenteric artery, spasm of vascular arcades, and impaired filling of intramural vessels. As a clinician, it is most important to remember to discuss your suspicion of mesenteric ischemia with the radiologist as this has been shown to increase the diagnostic yield¹¹. CTA can also detect complications of advanced ischemia including perforation, intra-peritoneal free air and abscess. Pneumatosis linearis is a sign of transmural infarction, especially in the presence of portomesenteric venous gas. The latter can also be seen with severe intraabdominal infection resulting from bacterial translocation after ischemia. If there is a clinical suspicion for acute mesenteric ischemia, CTA should be seriously considered, even in the presence of renal injury or concern for contrast-induced nephropathy, the risks of missing or delaying a diagnosis of acute mesenteric ischemia are believed to far outweigh the risks of acute kidney injury related to contrast administration. The role of diagnostic laparoscopy in acute mesenteric ischemia is limited. It should only be considered when the diagnosis remains un-confirmed after imaging and there is a high index of suspicion for acute mesenteric ischemia, or in selected cases to assess the extent of bowel infarction and gangrene prior to definitive surgical management^{1 2}.

Patients with signs of peritonitis of perforation related to acute mesenteric ischemia are candidates for laparotomy and exploration, like in this case. In the critically ill patient, damage control surgery is performed. Damage control surgery consists of emergency laparotomy, resection of necrotic intestine without anastomosis or stoma creation, and open thrombectomy in select cases and temporary closure. Second-look surgery is performed in the first 48 h to assess the bowels viability. Primary bowel anastomosis should be performed in hemodynamically stable patients, only if limited resection is performed and there is no concern of necrotic bowel being left behind. The extent of bowel necrosis (and in turn bowel resection) depends on the vascular involvement. In patients requiring extensive resection, short bowel

syndrome can occur when less than 200 cm of bowel is spared¹³. In these patients, long-term total parenteral nutrition (TPN) is required. If the clinical condition permits, revascularization (endovascular or surgical) should be attempted prior to bowel resection. This approach will preserve as much viable bowel as possible. There is no literature available on the appropriate time to initiate enteral nutrition in those patients with acute mesenteric ischemia. During the acute stage, the patient should be kept in fasting for bowel rest, and in anticipation of intervention. Once there is no clinical concern for ischemia and oral intake can be tolerated, enteral feeding can be started gradually¹⁴.

Conclusion

Intestinal ischemia is a rare cause of abdominal pain that mainly affects older adults with comorbidities mainly of cardiovascular origin such as atrial fibrillation, heart failure, valve disease, among others. It is important to recognize it early to prevent it from reaching intestinal necrosis, which is why it is vitally important to have a high index of suspicion. In the case presented in this section, we emphasize the importance of taking this diagnosis into account even in young patients, especially those who have a risk factor for developing it. From the above, we conclude that it is important to always take into account the diagnosis of intestinal ischemia in every patient who presents with abdominal pain, which, although it is usually considered a condition of older adults, can also affect young adults. with risk factors as was the case of our patient who had a history of an intra-abdominal inflammatory process (chronic pancreatitis) that led to her developing this condition at her young age.

Conflicts of interest

There was no conflict of interest during the study, and it was not funded by any organization.

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