

Mesenteric vein thrombosis treated successfully with ultrasound augmented thrombolysis

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Abstract

Mesenteric vein thrombosis is a potentially fatal condition that is associated with better outcomes with early diagnosis and intervention. A 32-year-old-man with Down syndrome presented with abdominal pain and was found to have extensive porto-spleno-mesenteric thrombosis with early bowel ischemia on computed tomography. He was treated successfully with ultrasound augmented thrombolysis. Ultrasound can improve efficiency of thrombolysis, decreasing the time required for thrombolysis by half, decrease thrombolytic dose and monitoring time and thus reduce overall costs and complications seen with long thrombolysis times. (*Acta gastroenterol. belg.*, 2012, 75, 55-57).

Key words : portal vein, mesenteric vein, venous thrombosis, ultrasound augmented thrombolysis.

Introduction

Mesenteric vein thrombosis is a rare but serious cause of mesenteric ischemia. Morbidity and mortality can be reduced by early diagnosis and institution of anticoagulation. Computed tomography (CT) is a rapid and sensitive study and can reduce potential treatment delays. The EKOS EndoWave Infusion Catheter System (EKOS Corporation, Bothell, WA) enhances catheter-directed thrombolysis by accelerating the fibrinolytic process via the application of ultrasound (1). Though there is good data on the use of ultrasound-augmented thrombolysis in arterial and venous thrombosis, there is little data on its use in the hepatic or porto-mesenteric venous thrombosis. We describe a patient with acute extensive thrombosis of the portal vein (PV), splenic vein (SV), superior mesenteric vein (SMV) and its major branches who was successfully treated with ultrasound augmented thrombolysis using tissue plasminogen activator (tPA).

Case report

A 32-year-old man with Down syndrome presented with progressively worsening abdominal pain for 4 days with radiation to the back. He did not have any fever, vomiting, melena or hematochezia. He was a non-smoker and had no history of previous abdominal surgery, pancreatitis, or liver disease. There was no family history of malignancy or hypercoagulable states. His examination showed a temperature of 99.1 degree F, pulse of 90/min and blood pressure of 112/70 mmHg. There was



Fig. 1. — CT scan shows portal vein thrombosis of the main portal vein and the large central branches (arrows).

diffuse abdominal tenderness without rebound tenderness, rigidity or palpable mass. Abdomen was tympanic with normo-active bowel sounds.

Laboratory findings included normal complete blood count, metabolic panel, liver function tests, amylase, and lactate level. A CT showed extensive acute thrombosis of the PV, SV, SMV and its major branches (Fig. 1). A moderate sized segment of the terminal ileum demonstrated circumferential wall thickening with a small amount of fluid noted along the base of the mesentery which was concerning for bowel ischemia. The spleen was not enlarged. Thrombophilia screening showed absence of lupus anticoagulant, Factor V Leiden and prothrombin gene mutation.

The patient was immediately started on anticoagulation with heparin. Given that the clot appeared acute and completely occlusive and there were signs of ischemia

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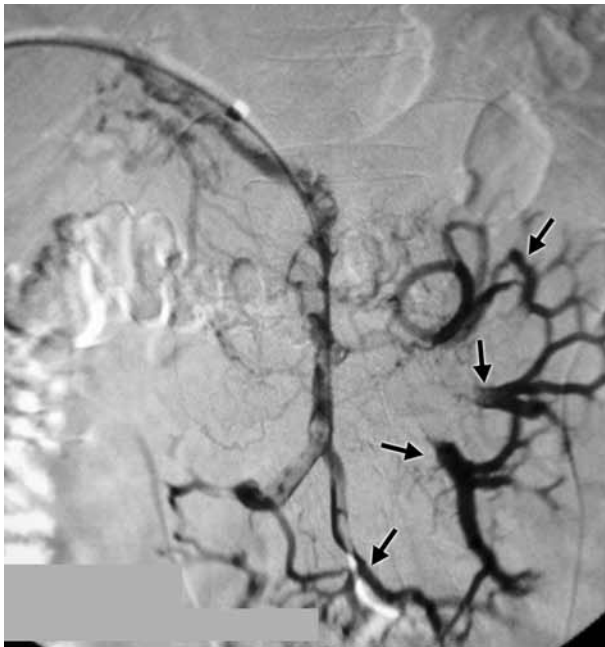


Fig. 2. — Transhepatic superior mesenteric vein (SMV) and portal angiogram shows a large amount of residual clot and poor flow after in site thrombolysis and angiojet thrombectomy. Note retrograde flow from SMV injection into other mesenteric veins (arrows) and poor portal filling.

but not infarction, thrombolysis was pursued in this patient. A transhepatic approach into the occluded right portal vein and contrast injection confirmed total occlusion of the main PV, SMV and the SV. SMV was selectively catheterized and in-site thrombolysis with tPA and angiojet thrombectomy was done that achieved partial recanalization with large residual clots and poor flow (Fig. 2). An 18 cm long EKOS catheter was then advanced deep into the SMV for ultrasound augmented thrombolysis with 2 mg/h tPA infusion (Fig. 3). Repeat portal venography at 19 hours showed significant improvement with patent SMV, main portal vein and right portal vein with good hepatoportal flow (Fig. 4). The left portal vein remained thrombosed. The abdominal pain and bowel thickening noted on CT had resolved. He developed pulsatile bleeding from the puncture site that required embolization of the right 9th and 10th intercostal arteries. The patient was transitioned from heparin to warfarin, and continues to do well, more than 15 months after discharge.

Discussion

Mesenteric vein thrombosis accounts for about 5% of cases of mesenteric ischemia (2). The high morbidity and mortality associated with this condition is attributed to delayed diagnosis due to the variable and non-specific nature of abdominal symptoms. Also, the rarity of the condition causes it to be misdiagnosed as more common abdominal conditions.



Fig. 3. — Plain abdominal x-ray shows the EKOS catheter within the superior mesenteric vein and portal vein. Note the multiple opaque transducers for ultrasound delivery along its working length.

Patients with acute and subacute thrombosis tend to present with abdominal pain that is typically out of proportion to findings on physical examination. They may have nausea, vomiting, diarrhea or blood in stool. The physical examination may range from normal to signs of peritonitis. Patients with chronic thrombosis usually present with complications related to portal hypertension such as ascites and variceal bleed (3).

Laboratory studies are not very helpful to confirm or exclude the diagnosis. Leukocytosis and metabolic acidosis may be seen. An elevated serum lactate is sensitive though non-specific for intestinal ischemia. Normal D-dimer levels have a good negative predictive value for acute thrombosis, but elevated levels are less useful for diagnosis.

Plain radiographs may be abnormal in 50-75% of patients but findings are rarely specific (4). Contrast enhanced CT is the diagnostic test of choice in patients stable enough to undergo the procedure (5). Multi-detector CT angiography is fast and accurate and in most cases can be used as the sole diagnostic procedure (6). Ultrasound can show a non-compressible mesenteric vein though it is user-dependent.

Predisposing factors for mesenteric thrombosis include intrabdominal inflammatory conditions, cirrhosis, abdominal trauma, malignancy, pregnancy and oral contraceptive pills (3).

The proportion of primary or idiopathic venous thrombosis continues to decline with increasing recognition of hypercoagulable states (3). The most common



Fig. 4. — Delayed angiogram after 19 hours of treatment with tissue plasminogen activator and therapeutic ultrasound show all the veins close to the EKOS catheter including the right portal vein, main portal vein, and superior mesenteric vein to be clot free with good flow.

inherited disorder appears to be Factor V Leiden mutation which is present in 20 to 40 percent of patients (7). The most important acquired hypercoagulable conditions are paroxysmal nocturnal hemoglobinuria and myeloproliferative disorders (8).

Early systemic anticoagulation is critical to stop the progression of ischemia to bowel infarction. Supportive measures including fluid resuscitation, nasogastric suction, and bowel rest should be instituted. Broad-spectrum antibiotics are appropriate with suspicion of peritonitis and bowel infarction. If the patient is clinically unstable or has signs of bowel infarction or peritonitis, immediate abdominal exploration with resection of infarcted bowel is warranted (9). Percutaneous interventions may be considered to preserve questionably viable bowel if a contraindication to anticoagulation exists. Depending on local expertise, mechanical thrombectomy or site-directed thrombolytic therapy may be used (10). Transcatheter thrombolysis has been beneficial in avoiding patient death, resolving thrombus, improving symptoms, and avoiding bowel resection. However, it can be associated with a high complication rate, indicating that this therapy should be reserved for patients with severe disease (11). The EndoWave Catheter utilizes ultrasound to improve the thrombolytic activity of thrombolytics.

Acousting microstreaming created by the ultrasound pulses is thought to improve penetration of the thrombolytic drug into the clot by a combination of a pumping effect, improved diffusion, cleavage of fibrin polymers to increase the surface for thrombolytic action, and improved binding of tPA to fibrin (1,12). Ultrasound can cut the time required for thrombolysis by about 50%, decrease drug dosage and of monitoring, and reduce bleeding complications (1). Only large vessels can be effectively treated with ultrasound but the tPA may lyse peripheral thrombi in the area. Chronic anticoagulation is important to decrease the high recurrence rate. Life-long anticoagulation is needed for patients with non-reversible risk factors or idiopathic thrombosis.

Though the mortality is high for acute mesenteric vein thrombosis, it has decreased over the last 4 decades, likely due to earlier diagnosis with more widespread availability of advanced imaging facilities. Since duration of the bowel ischemia is the major determinant of outcome, aggressive diagnostic and management protocol are needed on the part of the physician (2). Site directed thrombolysis can help to avoid resection of ischemic bowel. By improving the efficacy of thrombolysis and decreasing complications, ultrasound augmented thrombolysis should gain a wider role in mesenteric thrombosis.

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