Direct thrombolytic therapy in portal and mesenteric vein thrombosis

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A 34-year-old female from Laos presented to the emergency department with a 3-week history of worsening abdominal pain; she subsequently developed an acute abdomen requiring emergent exploratory laparotomy. An intraoperative angiography was performed, which revealed complete portal vein thrombosis. A 5F 20-cm infusion catheter was placed through an omental vein, and tissue plasminogen activator was administered directly into the catheter with successful decrease in thrombus burden. There are few controlled data on which to base clinical decisions in patients with portal vein thrombosis. Our case expands on these earlier reports that direct thrombolysis can be safely performed using local, intraclot infusions for portal vein thrombosis, and thrombolytic doses can be kept relatively low, limiting the risk of bleeding complications. (J Vasc Surg 2012;56:1124-6.)

CASE REPORT

A 34-year-old female from Laos presented to the emergency department with a 3-week history of worsening abdominal pain, which had significantly exacerbated over the last 48 hours. Pain was characterized as diffuse and constant with radiation to the lower back. She also endorsed nausea, nonbilious vomiting, anorexia, sweats, and chills. The patient had several similar episodes recently but of less intensity that resolved spontaneously. She also denied any medical problems or prior surgeries. Her only medication was oral contraceptives, which were started 1 month ago. She had no known drug allergies and denied any alcohol, tobacco, or illicit drug use. The patient immigrated into the country from Laos 6 months ago and had no immediate family in the region. Family history was significant for gastric cancer but otherwise unremarkable.

On physical examination, her temperature was 97.6°F. Her pulse had a regular rhythm with a rate of 80 beats per minute and no murmurs, rubs, or gallops, and her blood pressure was 102/66 mm Hg. She appeared well-nourished but diaphoretic and in distress secondary to abdominal discomfort. The abdomen was tender to light palpation in all quadrants and distended, and she had rebound tenderness and involuntary guarding. The rectal examination revealed normal tone and guaiac-positive stool. She did not have any obvious hernias or masses on examination.

The laboratory analysis revealed a normal white blood count at 9.2, hemoglobin 12.4, hematocrit 36.7, and lactic acid of 1.2. Her liver function tests, chemistry panel, and coagulation profile were all within normal limits. A computed tomography (CT) scan of the abdomen and pelvis with intravenous and oral contrast was obtained in the emergency department (Fig 1).

CT imaging revealed extensive portal vein thrombus involving the main, right, and left portal veins extending into the superior mesenteric vein and splenic vein. There was also noted diffuse thickening of the jejunal loops with hyperdense walls. Clinically, the patient developed an acute abdomen.

Three hours after presentation to the emergency room, the patient was emergently taken to the operating room for exploratory laparotomy because of subsequent development of acute abdomen. Upon entering the intra-abdominal cavity, abundant ascites was encountered. Whereas mesenteric arteries remained pulsatile on palpation, extensive thrombosis and engorgement were noted grossly in the mesenteric veins. The liver and spleen were unremarkable upon careful inspection. A 75-cm section of the small bowel was found to be necrotic and resected. Whereas surgical thrombectomy and angioplasty with stenting were considered prior to the operation, the extent of the disease into mesenteric veins prompted us to favor local thrombolytic therapy. An angiography was, therefore, performed intraoperatively, which revealed complete portal vein and superior mesenteric vein thrombosis (Fig 2). This was done through a small incision made in an omental vein, and a 5F 20-cm infusion catheter was inserted with advancement of the distal tip to the distal superior mesenteric vein under fluoroscopic guidance. The cannulated catheter was then secured in the omental vein using a 3-0 silk suture and externalized through the patient’s left lower abdomen. Tissue plasminogen activator (tPA; alteplase) was administered locally through the catheter, and tPA infusion was started at 0.5 mg per hour postoperatively. The patient’s abdomen was left open with a temporary abdominal closure device. Follow-up venogram the next day revealed a decrease in thrombus burden in the portal vein, superior mesenteric vein, and splenic vein (Fig 3); the catheter was, thus, retrieved and omental vein ligated, and her abdomen was closed at that time. Heparinization was started postoperatively. The patient had a subsequent uneventful recovery with complete resolution of symptoms and was discharged on oral anticoagulation. Ultimately, hypercoagulable workup started preoperatively, which included factor V Leiden, prothrombin 20, 210 mutation, protein S deficiency, and antithrombin III deficiency, revealed protein C deficiency in the patient. Although we considered schistosomiasis and other unusual forms of abdominal and liver disease, given the patient’s recent immigration from Laos, she did not have hepatosplenomegaly or other skin findings to suggest otherwise.
Acute portal vein thrombosis is characterized by the development of thrombus in the portal vein or its left or right branches. Further extension to the mesenteric venous arches causes intestinal infarction, with a reported mortality of up to 50%. Without recanalization, a cavernous hemangioma develops. These dilated, thin-walled collection of vessels are prone to potentially fatal gastrointestinal bleeding, and stagnant blood within the channels is associated with thrombosis. Revascularization is, therefore, a major goal for the treatment of portal vein thrombosis, which can be a pressing challenge, as most cases are recognized in an acute setting.

Various etiologies have been described for portal vein thrombosis. In adults, approximately 25% of patients with portal vein thrombosis have underlying cirrhosis. In one series, portal vein thrombosis was identified in 79 of 701 hospitalized patients with cirrhosis (11%) who underwent routine ultrasound screening. Of these, 34 (43%) were asymptomatic, whereas 45 (57%) had associated symptoms, including portal hypertensive bleeding, abdominal pain, and intestinal infarction secondary to concomitant mesenteric vein involvement. The annual incidence of portal vein thrombosis among patients with cirrhosis is <1%. The development of portal vein thrombosis in patients with cirrhosis appears to correlate with the severity of underlying liver disease. The factors behind why cirrhosis increases the risk of portal vein thrombosis has not been well studied, but it is presumed to be related to stasis or retrograde flow through the portal vein.

In patients without cirrhosis, a plethora of causes for portal vein thrombosis have also been described. In one series of 184 such adults, 34% reported a prior history of abdominal surgery, 14% had pancreaticobiliary disease, and 9% had alimentary tract disease. These conditions may have predisposed patients to portal vein thrombosis because of direct injury to the portal vein, stasis of portal vein blood flow, or general hypercoagulability. In another series, a local risk factor (eg, acute pancreatitis) was observed in 21% of patients; in 52%, a prothrombotic mutation was found, including protein C deficiency, factor V Leiden, methylenetetrahydrofolate reductase gene mutation, and prothrombin gene mutation. Other risk factors attributed to portal vein thrombosis include oral contraceptive use.
and trauma. In children, the most common cause is omphalitis, which causes thrombophlebitis of the umbilical vein and subsequently the portal vein. No apparent cause for portal vein thrombosis is evident in more than 25% of patients.8

Acute portal vein thrombosis is usually clinically silent and often diagnosed during radiologic examination for other reasons (such as acute pancreatitis). When symptomatic, portal vein thrombosis manifests in a variety of ways, including hepatic dysfunction, ascites, splenomegaly, and variceal bleeding. Patients in whom portal vein thrombosis is suspected should undergo radiologic testing to define the extent of the clot. Ultrasound with Doppler flow studies, CT scanning, and magnetic resonance angiography are often helpful in this setting. Venous phase angiography remains the gold standard in patients in whom the diagnosis is strongly suspected. Most patients with portal vein thrombosis should undergo evaluation for a hypercoagulable state.

There are few controlled data on which to base clinical decisions in patients with portal and mesenteric vein thrombosis. Therefore, treatment should be determined by the individual patient’s clinical situation, the pathophysiology involved, and the available expertise. Initial anticoagulation should be started if the patient is stable without signs and symptoms of surgical abdomen. Once an acute abdomen develops, exploratory laparotomy is indicated and treatment options include a portosystemic shunt, surgical thrombectomy, angioplasty, or thrombolysis. Thromboses of both portal and mesenteric veins are typically associated with more congestion and fewer collateral vessels, as with our case. We, therefore, suggest that thrombolytic therapy can be favored in these circumstances administered locally by a venous catheter. Alternate means of thrombolysis through transjugular and transeptal routes have been described in the literature. However, retrograde access through omental veins allows easy and safe access if the patient has already undergone laparotomy for acute abdomen. Thrombolysis also has the advantage of lysing smaller thrombi not targeted by mechanical thrombectomy. The choice of thrombolytic agent should be considered: tPA was favored in our patient over urokinase given comparatively less bleeding risk with tPA, especially in light of the patient’s heme-positive stool. A 2009 guideline issued by the American Association for the Study of Liver Diseases recommends giving anticoagulation therapy for at least 3 months starting with low-molecular-weight heparin and shifting to oral anticoagulation once the patient’s condition has stabilized.7 In a study of patients with portal vein thrombosis in which 27 patients were anticoagulated, anticoagulation was associated with recanalization of the portal vein in about 40% of patients compared with none of the 11 patients who were not anticoagulated.8 Anticoagulation should be continued long term in patients with acute portal vein thrombosis who have a permanent thrombotic risk factor that is not correctable.

Our case expands on these earlier reports by illustrating two important points. First, thrombolyis can be safely performed using local, intraclot infusions for extensive portal vein and mesenteric vein thrombosis. Second, thrombolytic doses can be kept relatively low, limiting the risk of bleeding complications. Whereas low-dose thrombolytic infusion is generally considered safe, treatment of portal vein is not commonly performed and can now be considered when given in low doses. We believe this case highlights the effectiveness of direct intraclot infusion in decreasing thrombus burden and potentially limiting further bowel ischemia.

REFERENCES

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