

Treatment of a contained rupture of a splenic artery pseudoaneurysm with direct thrombin injection

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ABSTRACT

Splenic artery pseudoaneurysm is a rare and potentially fatal condition. In the present report, we describe the case of a 50-year-old woman with chronic pancreatitis who presented with worsening abdominal pain. Computed tomography demonstrated a 3.5-cm splenic artery pseudoaneurysm of the mid-splenic artery. The patient underwent attempted endovascular repair of the pseudoaneurysm that was unsuccessful. Open conversion revealed an inaccessible splenic artery due to chronic pancreatitis that resulted in dense retroperitoneal fibrosis, and repair was achieved via direct thrombin injection under ultrasound guidance of the pseudoaneurysm and splenectomy. The patient recovered well, and computed tomography at 3 days postoperatively revealed complete thrombosis of the pseudoaneurysm. (J Vasc Surg Cases Innov Tech 2024;10:101398.)

Keywords: Endovascular; Pseudoaneurysm; Splenic; Surgical; Thrombin

The development of a splenic artery pseudoaneurysm is a rare and potentially life-threatening event.¹ The pathology is frequently of unclear etiology.^{2,3} It is most often associated with pancreatitis, trauma, malignancy, iatrogenic injury, and segmental arterial mediolysis.⁴ The incidence in patients with pancreatitis ranges from 1.3% to 10%; however, because some of these are asymptomatic, the true incidence is unknown.⁴ A review by Tessier et al.⁵ identified 157 patients with a splenic artery pseudoaneurysm in the literature. Many of these patients underwent repair with distal pancreatectomy and splenectomy (48%), followed by transcatheter embolization, stenting, ligation, and splenectomy.⁵ In this report, we present a patient with a symptomatic splenic artery pseudoaneurysm associated with chronic pancreatitis resulting in dense retroperitoneal fibrosis that required eventual management with open thrombin injection of the pseudoaneurysm and splenectomy. The patient provided written informed consent for the report of her case details and imaging studies.

CASE REPORT

A 50-year-old woman with a history of chronic pancreatitis, diabetes mellitus type 1, venous thromboembolism (treated



Fig 1. Preoperative three-dimensional computed tomography (CT) reconstruction.

with apixaban), and migraine headaches complained of worsening abdominal pain. She did not have a history of alcohol abuse. The patient had initially developed recurrent episodes of pancreatitis after partial gastrectomy and cholecystectomy in 2021. She presented to an outside facility with 3 days of nausea, vomiting, and epigastric abdominal pain, which she reported differed from her usual pancreatitis-related pain. A computed tomography (CT) scan of the abdomen demonstrated a 3.5-cm splenic artery pseudoaneurysm that had not been visualized on a CT scan 1 month prior. The CT scan also demonstrated a 5.2 × 2.8-cm pseudocyst adjacent to the stomach (Figs 1 and 2). The patient was then transferred to our facility.

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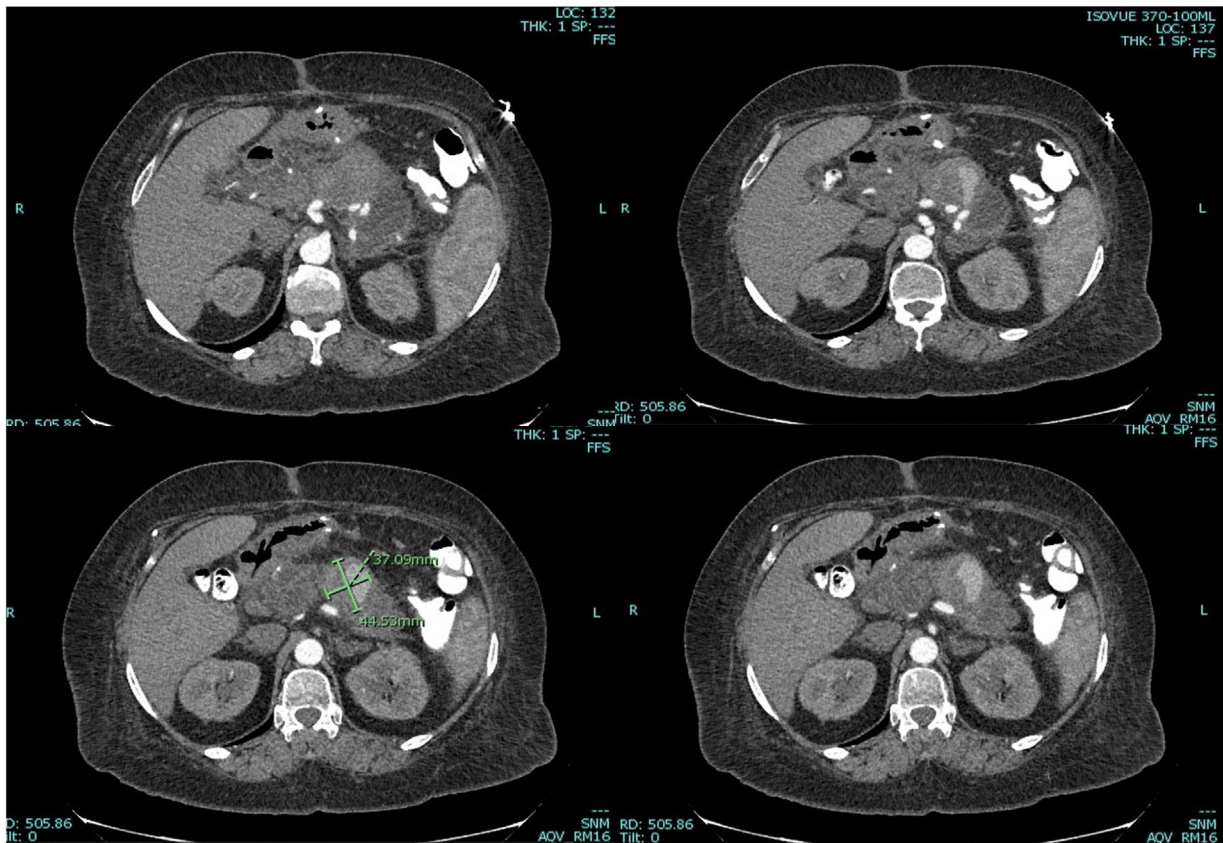


Fig 2. Preoperative computed tomography (CT) angiogram showing splenic artery pseudoaneurysm and pseudocyst.

On arrival, the patient reported epigastric abdominal pain, nausea, and emesis. She was hemodynamically stable with a normal white blood cell count (5.7 K/ μ L) and anemia with a hemoglobin of 9.8 g/dL. The lipase level was within normal limits (12 U/L). Given the patient's radiographic findings and symptoms, the decision was made to proceed to the hybrid operating room for pseudoaneurysm coil embolization.

PROCEDURE

The procedure began with ultrasound-guided right common femoral artery access. A combination of a 6F sheath, 0.035-in. wires and catheters, and 0.014-in. catheters and wires were then used to attempt access to the splenic artery. Given the significant tortuosity, the wire and catheters were unable to track into the splenic artery (Fig 3). Also, because of the downward angulation of the celiac artery, we next performed ultrasound-guided left brachial artery access and placed a 5F sheath. We again attempted to access the splenic artery but were unsuccessful. Given the patient's symptomatic status and risk of further rupture, we elected to convert the procedure to exploratory laparotomy. A standard midline incision was made, and adhesion lysis was performed. Dense

fibrosis of the retroperitoneum was encountered on exploration. The lesser sac was entered, and the pseudoaneurysm and pancreatic pseudocyst were visualized. However, given the degree of inflammation, neither could be safely dissected. General surgery was called into the operating room to assist with splenic mobilization in a standard fashion. We next attempted retrograde cannulation of the splenic artery from the hilum but were unable to pass a wire. We then attempted to isolate the celiac artery toward its origin; however, chronic inflammation made this prohibitively risky. At this time, we used ultrasound to identify the pseudoaneurysm in the retroperitoneum through the open lesser sac. Under ultrasound guidance, we placed an 18-gauge spinal needle through the pancreatic pseudocyst into the pseudoaneurysm. Pulsatile flow was confirmed, and then under color flow imaging guidance, thrombin (1000 U/mL) was injected into the pseudoaneurysm, with cessation of flow noted. The spleen was then removed to promote splenic artery thrombosis. Drains were left in the splenic bed and lesser sac. Postoperatively, the patient was transported to the surgical intensive care unit. The remainder of her hospital course was uncomplicated. Repeat CT angiography on postoperative day 3 was

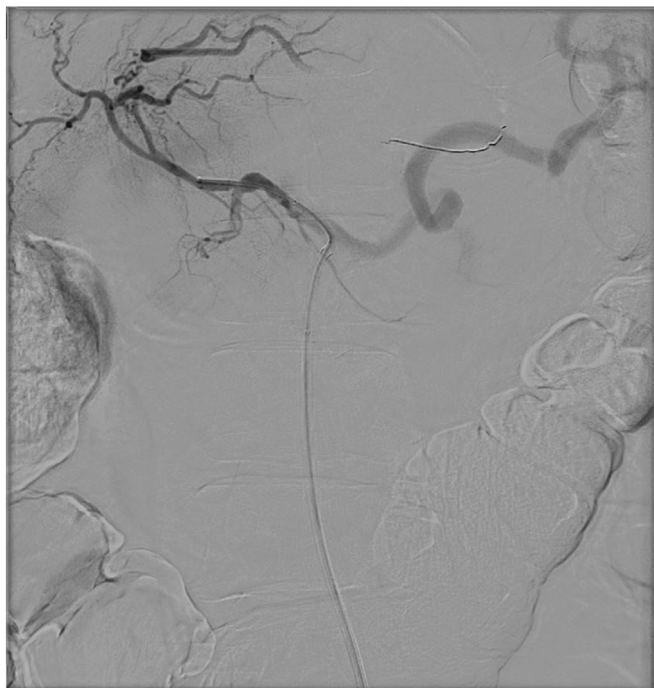


Fig 3. Intraoperative angiogram of the celiac axis.

performed, which showed complete thrombosis of the pseudoaneurysm (Figs 4 and 5). The drains were removed on postoperative day 7. The patient was discharged to a skilled nursing facility on postoperative day 9. Our patient was last seen 17 months after the procedure with no long-term complications from our intervention.

DISCUSSION

Although pseudoaneurysms of access vessels are relatively common complications of access, those of the visceral vessels are rare and require a more complicated management strategy. In the setting of chronic pancreatitis, it is theorized that the pseudoaneurysm formation is due to enzymatic degradation of the arterial wall.⁶ In the present case of splenic artery pseudoaneurysm, the risk of catastrophic bleeding prompted repair. This repair was complicated by a pancreatic pseudocyst and retroperitoneal fibrosis, making endovascular access unobtainable. In the present report, we describe another option for the patient with a hostile abdomen precluding repair. The decision to use thrombin injection was based on our institutional experience with peripheral artery pseudoaneurysm injection.

In a review by Tessier et al,⁵ patients with pseudocysts had a higher rate of failure of endovascular management (20% vs 13%). Multiple treatment options are available for exclusion of the pseudoaneurysm, including

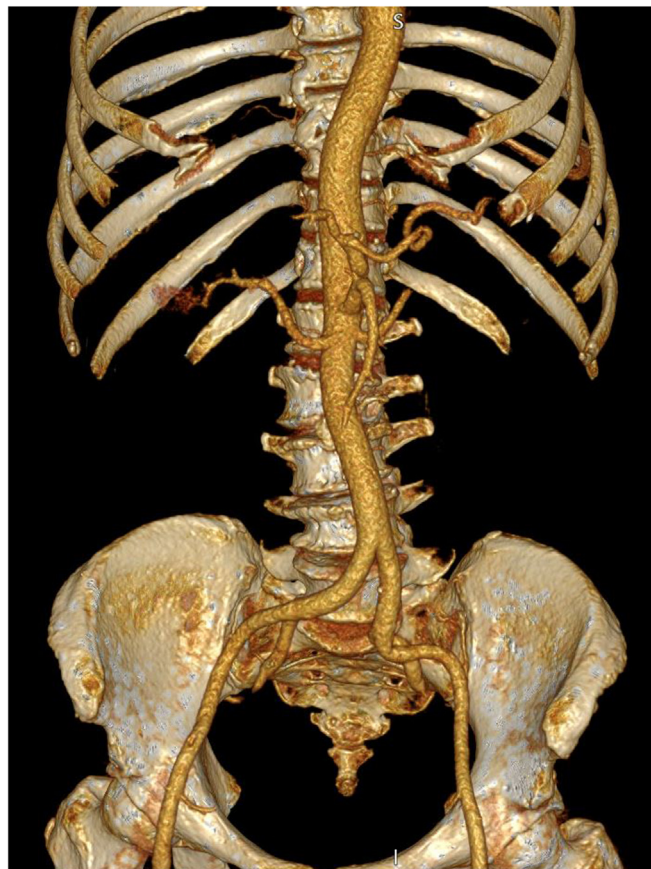


Fig 4. Postoperative three-dimensional computed tomography (CT) reconstruction.

splenectomy with or without distal pancreatectomy, transcatheter embolization or stenting, and ligation. Multiple other options are available for embolization, including direct sheath access to the pseudoaneurysm to plug or coil the splenic artery and needle access with gel foam slurry administration to minimize embolization.^{7,8} We also elected to remove the spleen in our patient to maximize the likelihood of successful thrombosis of the pseudoaneurysm and feeding splenic artery.

CONCLUSIONS

Visceral artery pseudoaneurysms are a rare disease process with potentially fatal outcomes if not recognized and treated in a timely manner.¹ Multiple treatment options are available to the clinician, ranging from open repair to endovascular occlusion of the pseudoaneurysm. Given a patient with a contained splenic artery pseudoaneurysm rupture and when standard treatments are not successful, direct thrombin injection under ultrasound guidance in the operating room should be considered as an option.

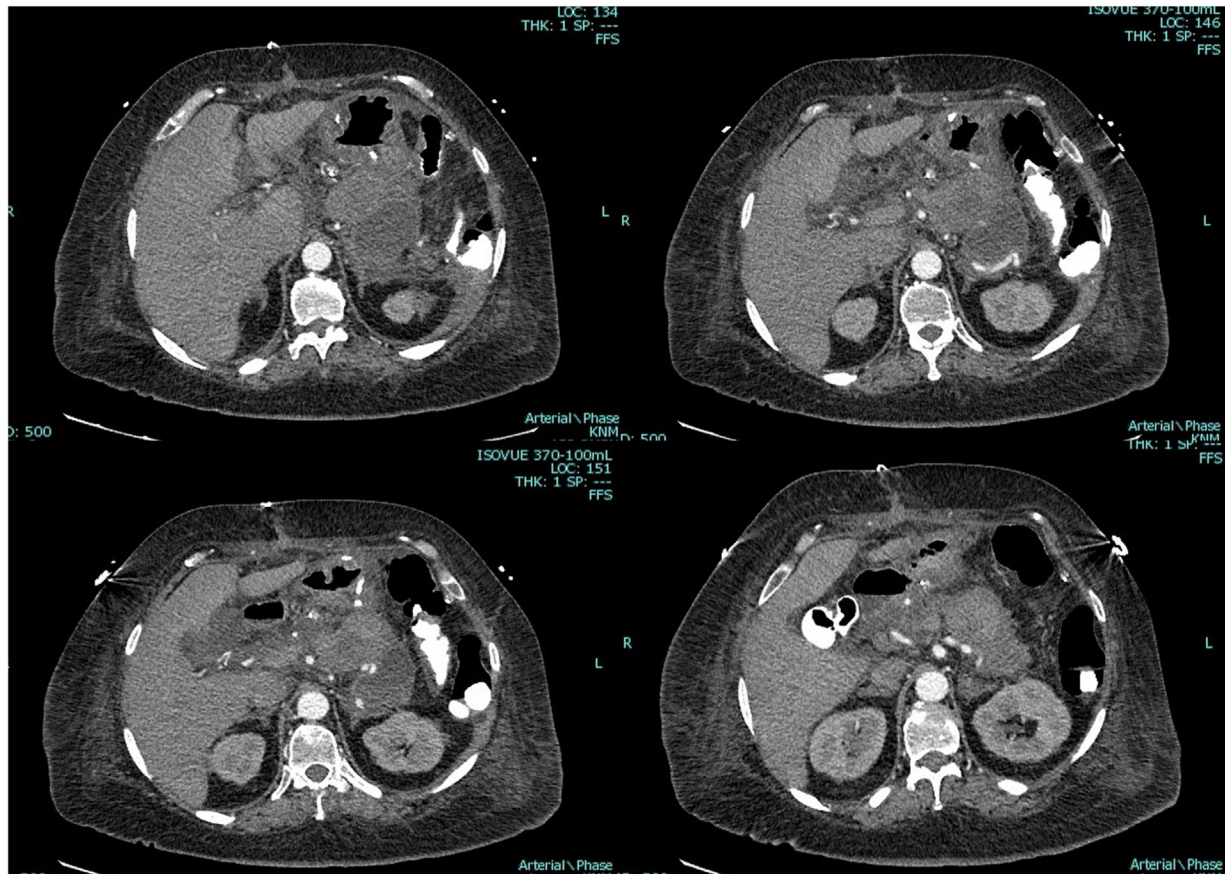


Fig 5. Postoperative computed tomography (CT) angiogram showing thrombosed splenic artery pseudoaneurysm and pseudocyst.

DISCLOSURES

None.

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