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Case Report

Transcatheter embolization of anticoagulation related pancreatic pseudocyst hemorrhage: A case report

Naomi K. Atkins, DO[a,*], *Blake M. Kramer, DO*[a], *Charles A. Kitley, MD*[b]

[a] *Department of Radiology, University of Missouri, One Hospital Drive, Columbia, MO 65212*
[b] *Department of Radiology, Madigan Army Medical Center, 9040 Jackson Ave, Tacoma, WA 98431*

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ABSTRACT

Hemorrhage associated with anticoagulation therapy is a feared and relatively common complication. Few cases have been documented of spontaneous pancreatic hemorrhage related to anticoagulation, and fewer yet of ruptured pancreatic pseudocyst secondary to anticoagulation-related bleeding. We describe the case of a 74-year-old female with massive intra- and extraperitoneal hemorrhage secondary to an anticoagulation-related ruptured hemorrhagic pancreatic pseudocyst that was treated successfully with coil embolization. An inferior vena cava filter was placed at the same time as the embolization procedure, as she had a contraindication for anticoagulation in the setting of submassive pulmonary emboli and lower extremity deep venous thrombosis.

Introduction

Hemorrhagic complications occur in approximately 2% of patients treated with anticoagulation. The most common bleeding site is within the gastrointestinal tract, with the overall highest mortality site occurring in cases of intracranial hemorrhage [1]. Few cases have been reported of spontaneous bleeding into the pancreas or a pancreatic pseudocyst related to anticoagulation. Hemorrhage associated with pancreatic pseudocysts is a rare complication of acute and chronic pancreatitis, with high mortality rates. Pancreatic pseudocyst rupture with associated intraabdominal hemorrhage is an even rarer subset of these bleeds. Only 4 other cases of spontaneous pancreatic hemorrhage associated with anticoagulation were found in the literature [2–4]. None of these were treated with endovascular embolization.

Declaration of Competing Interest: The authors declare that they have no conflict of interest.
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* Corresponding author.
E-mail addresses: atkinsn@health.missouri.edu (N.K. Atkins), kramerB@health.missouri.edu (B.M. Kramer), kitleyc@health.missouri.edu (C.A. Kitley).

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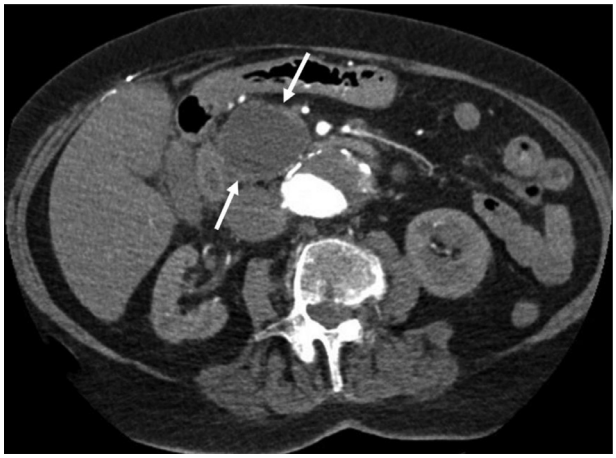


Fig. 1 – Partially imaged cyst (white arrows) associated with the head of the pancreas as visualized on the CT angiogram of the chest done for pulmonary emboli while the patient was in the emergency room.

Case report

A 74-year-old female with no history of prior thromboembolism presented to the Emergency Department with worsening shortness of breath. She was found to have acute bilateral obstructive segmental pulmonary emboli (PE) with pulmonary infarcts and extensive acute left lower extremity deep venous thrombosis (DVT). She had a simple appearing pancreatic cyst which was noted on her Computed Tomography (CT) angiogram of the chest (Fig. 1), without evidence of hemorrhage on the initial study. She was admitted to the hospital and started on heparin drip for her PEs while she underwent further evaluation of the pancreatic cyst.

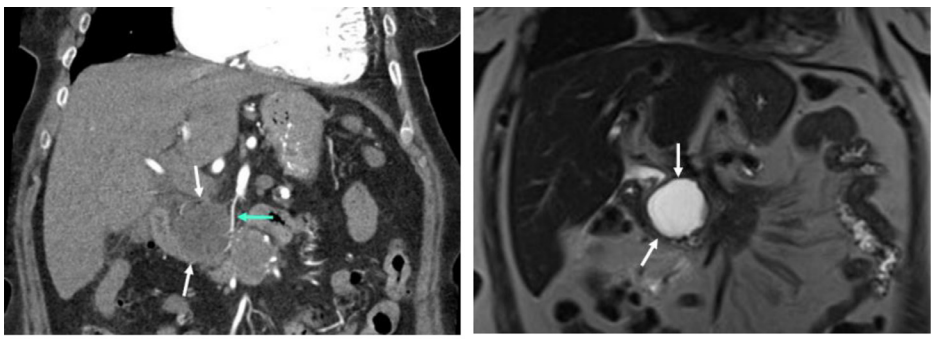
The pseudocyst had been previously noted on a CT angiogram of the chest almost 3 years prior to this hospital stay and was stable in appearance. CT of the abdomen was performed with a differential diagnosis to include uncomplicated pancreatic pseudocyst versus side branch intraductal papillary mucinous neoplasm (Fig. 2a) with no evidence of hemorrhage. Magnetic Resonance Cholangiopancreatography was also performed which confirmed the finding to represent an uncomplicated pancreatic pseudocyst (Fig. 2b).

The patient had no symptoms of pancreatitis upon admission for her PE, however she began having abdominal pain 5 days after admission and her pancreatic enzymes were checked on day 6 of her hospitalization and were found to be mildly elevated. The patient had previously been transitioned from a heparin drip to low-molecular weight heparin approximately 12 hours prior for treatment of her PE. Over the course of the next 6 hours she began to have hemodynamic instability, worsening pain, and acute anemia, with significant drops in her blood pressure and baseline hemoglobin levels, requiring higher level care and eventually intubation. Emergent imaging was then requested to evaluate for a source of hemorrhage causing her acute hemodynamic decline.

A CT of the abdomen was completed using a GI bleed protocol including venous and delayed imaging. She was noted to have a large intraperitoneal and retroperitoneal hematoma with internal hematocrit levels measuring $12.4 \times 20.1 \times 21.1$ cm (Fig. 3), which was new from prior imaging. Additionally, the arterial and delayed imaging demonstrated active extravasation in the area of the previously noted pancreatic pseudocyst (Fig. 4). No vascular aneurysms were identified adjacent to the pseudocyst or within the visualized vessels. Interventional radiology was consulted to determine if endovascular treatment could be utilized as the patient remained hemodynamically unstable and was a poor surgical candidate.

The patient was brought to the angiography suite intubated and sedated. An existing right femoral arterial catheter was prepped and exchanged for a 5 French vascular access sheath over a 0.035 Bentson wire. Using a 5 French Mickelson catheter (Cook Medical, Bloomington, IN), the celiac artery was cannulated and a subselective celiac arteriogram was then performed. The celiac artery demonstrated normal branching anatomy.

A 2.8F Progreat microcatheter (Terumo Medical, Somerset, NJ) and 0.016 Fathom microwire (Boston Scientific, Marlborough, MA) were then used to cannulate the gastroduodenal artery, and a superselective arteriogram of the gastroduodenal artery was performed. The gastroduodenal artery appeared spasmed with multiple irregular vessels branching distally in the area of the known pseudocyst (Fig. 5a). Given the appearance, four 4 mm Azur microcoils (Terumo



a b

Fig. 2 – Contrast enhanced CT of the abdomen (a) obtained during admission better visualizes the cyst (white arrows) with an adjacent vessel branching from the SMA (green arrow). MRCP (b) obtained following the CT demonstrates a simple cyst most consistent with a pancreatic pseudocyst. No hemorrhage was noted on the CT or MRCP.

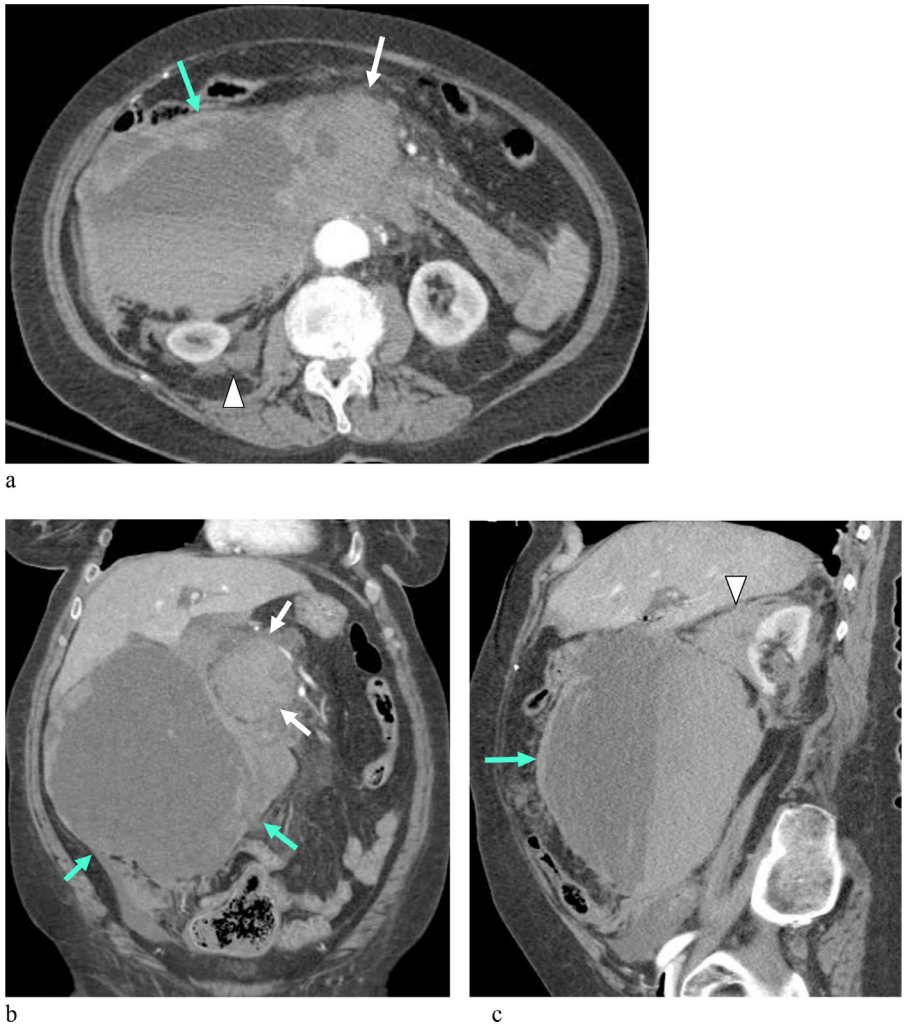


Fig. 3 – Axial (a), coronal (b), and sagittal (c) images from a contrast enhanced CT angiogram of the abdomen obtained after the patient became hemodynamically unstable demonstrates a large intraperitoneal (green arrows) and extraperitoneal hemorrhage (white arrowheads) extending outside of the previously visualized pancreatic pseudocyst (white arrows).

Medical, Somerset, NJ) were then used to embolize the gastroduodenal artery to prevent extravasation and collateral flow into the area of hemorrhage seen on prior CT. A repeat angiogram of the gastroduodenal artery did not show any evidence of active extravasation and there was significantly decreased flow through the gastroduodenal artery (Fig. 5b). The 5 French Mickelson catheter was then used to access the superior mesenteric artery, and a subselective arteriogram of the superior mesenteric artery was performed. The SMA angiogram demonstrated a small area of blush and active extravasation from the first branch supplying the inferior pancreaticoduodenal artery (Fig. 6a). Superselective arteriography of this vessel demonstrated a large amount of rapid active extravasation (Fig. 6b, 6c). The 2.8F Progreat microcatheter and 0.016 Fathom wire were then used to cannulate the vessel adjacent to the hemorrhage and one 2×4 mm Cook tornado microcoil (Cook Medical, Bloomington, IN) was used to embolize this branch. Repeat arteriogram after embolization demonstrated complete cessation of flow to the area of focal hemorrhage within this vessel (Fig. 7a, 7b). No additional areas of active extravasation were identified. All wires and catheters were removed and the vascular sheath was secured in place with a Vicryl suture to be used as an arterial line upon recovery in the intensive care unit.

As the patient had extensive thromboembolic disease including multiple acute PEs and extensive left lower extremity DVT, the primary team had requested an inferior vena cava (IVC) filter to be placed at the time of the angiogram given her current contraindication to anticoagulation. Following the angiogram, the right neck and chest were prepped and the right internal jugular was accessed with a micropuncture system under direct ultrasound guidance. A vascular access sheath from a Gunther Tulip delivery kit (Cook Medical, Bloomington, IN) was advanced into the distal inferior vena cava, and an inferior vena cavogram was performed. The initial venogram of the iliac veins and inferior vena cava demonstrated significant compression on the proximal IVC due to the large intraabdominal hematoma. The IVC was patent, however, with multiple large collaterals visualized within the abdomen surrounding the area of hemorrhage (Fig. 8a). The IVC filter was then

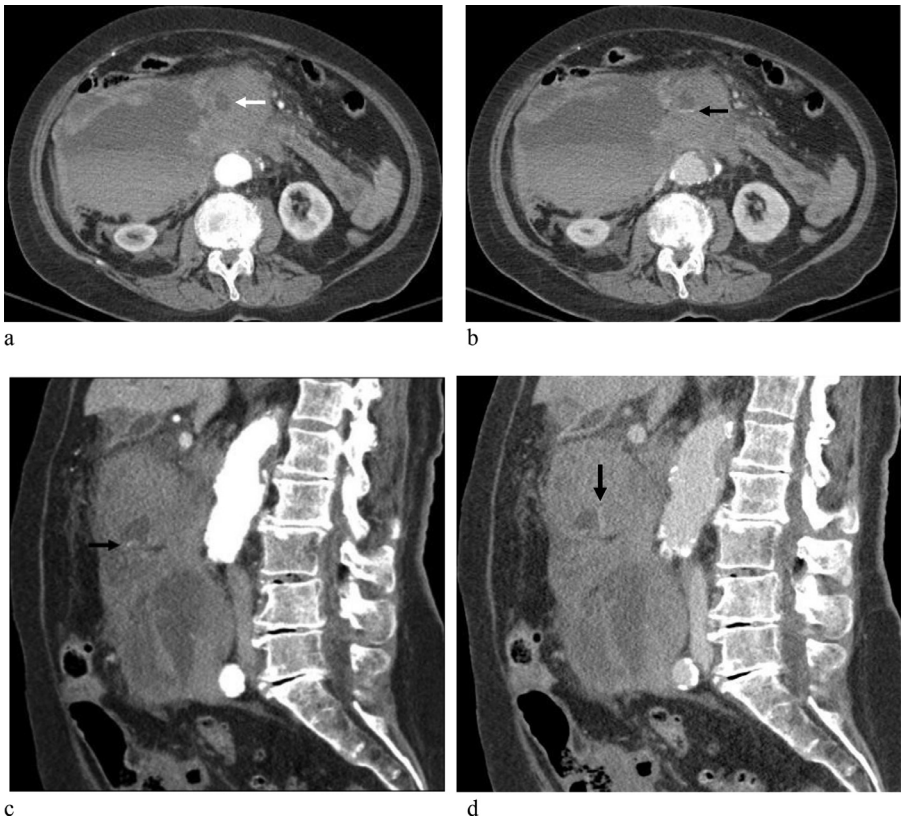


Fig. 4 – Axial arterial (a) and delayed (b) images from the contrast enhanced CT angiogram of the abdomen demonstrate an area of relative hypodensity on arterial phase images (white arrow) followed by layering of the hyperdense contrast on delayed imaging (black arrow). Sagittal arterial (c) and delayed (d) images from the contrast enhanced CT angiogram of the abdomen demonstrate a bright spot on the arterial images (black arrow) followed by layering of the hyperdense contrast on delayed imaging (black arrow). Findings are consistent with active extravasation of contrast.

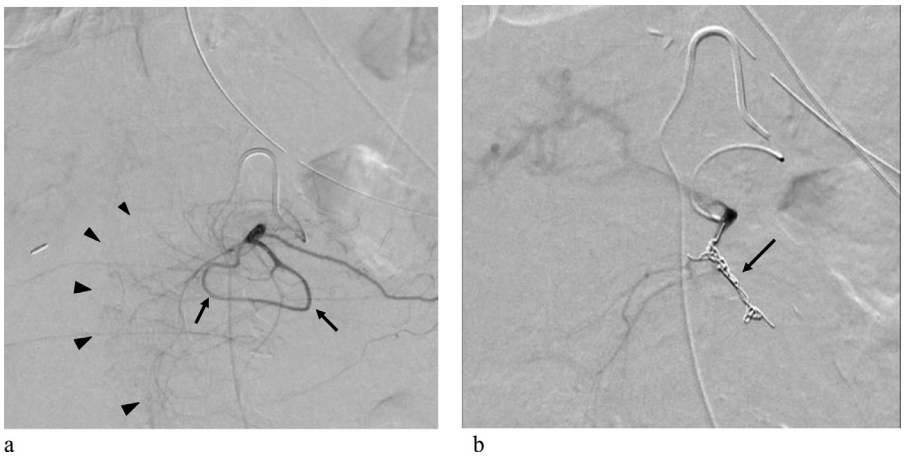


Fig. 5 – Digital subtraction arteriographic images of the gastroduodenal artery (a) which appears spasmed (black arrows) with multiple irregular appearing branches in the distribution of the pseudocyst and intra-abdominal hemorrhage (black arrowheads). Digital subtraction images following coil embolization (b) demonstrates little to no flow in the gastroduodenal artery (black arrow).

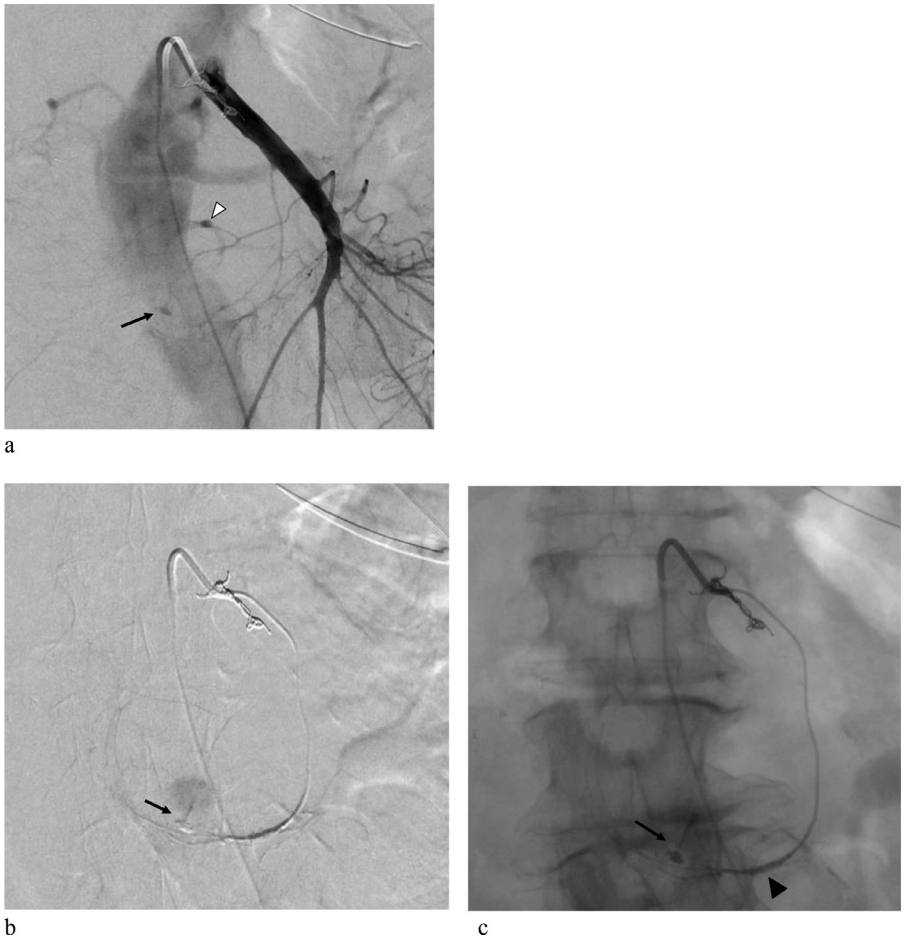


Fig. 6 – Digital subtraction images of selective SMA arteriogram (a) demonstrates a small area of active extravasation of contrast (black arrow). The rounded area of dense contrast more superiorly represents a tortuous area within a lumbar artery (white arrowhead). Subtracted (b) and unsubtracted (c) images of a superselective arteriogram of the pancreaticoduodenal artery demonstrates rapid extravasation of contrast (black arrows). There was mild irregularity of the vessel proximal to the area of active bleeding (arrow head).

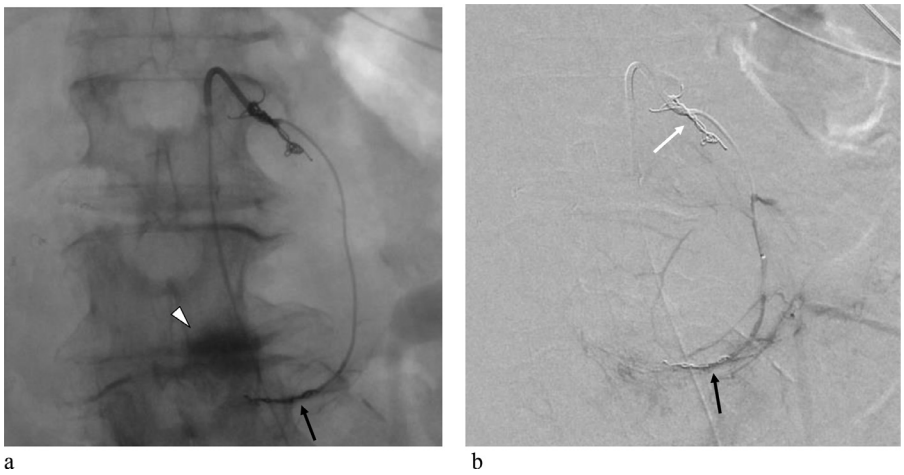


Fig. 7 – Unsubtracted (a) and subtracted (b) arteriographic images following coil embolization of the pancreaticoduodenal artery (black arrows) demonstrate no flow beyond the coil mass. Residual extravasated contrast is seen within the area of hemorrhage on the unsubtracted images (a) (white arrowhead). The coil mass in the GDA (white arrow) is also visualized on subtracted images (b).

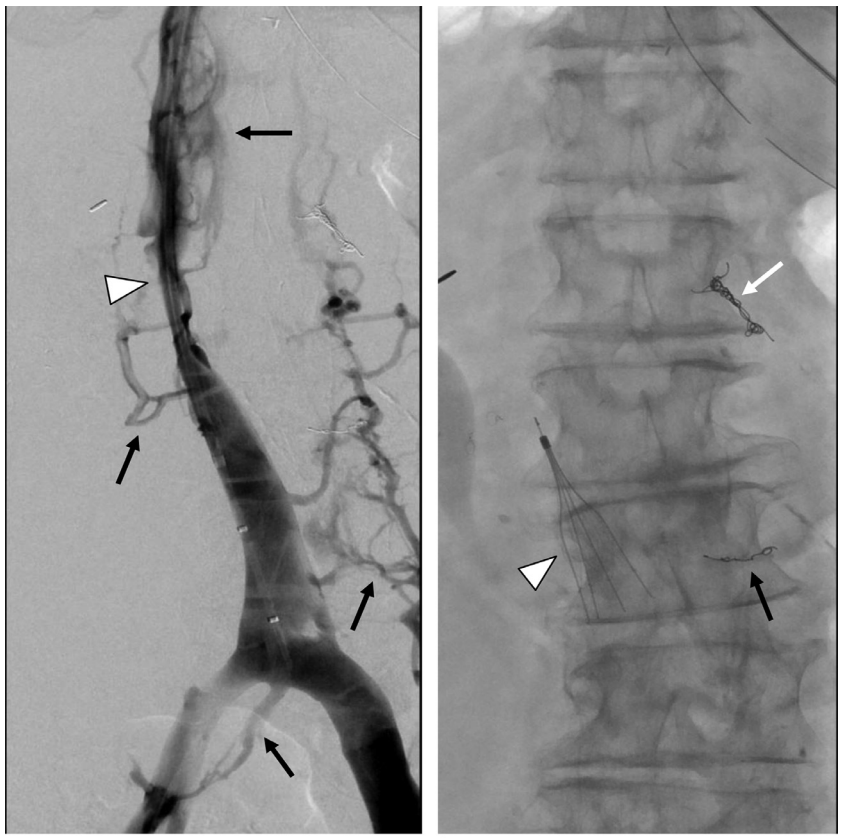


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Fig. 8 – Subtracted images of inferior venocavogram (a) demonstrates compression and displacement of the IVC (white arrowhead) with multiple large collateral vessels to allow for blood return (black arrows). Unsubtracted images (b) following IVC filter placement demonstrate the IVC filter (white arrowhead) and 2 coil masses, GDA (white arrow) and pancreaticoduodenal artery (black arrow).

successfully deployed within the infrarenal IVC above the iliac vein bifurcation using direct fluoroscopic visualization, with the tip of the filter positioned at the level of L2 in the distal IVC due to compression of the more proximal IVC. Postprocedure images demonstrated successful placement of the inferior vena cava filter with all legs deployed successfully and in good position (Fig. 8b). The patient tolerated both procedures well and there were no complications.

Discussion

Hemorrhage associated with acute and chronic pancreatitis is a well-known complication with a mortality rate of up to 40% [5–7]. Rates of hemorrhage vary across multiple studies, ranging from 1%-31% [5]. The majority of hemorrhagic complications discussed in the literature are related to bleeding within the GI tract or development of pseudoaneurysms. Bleeding into a pancreatic pseudocyst is less common. Pancreatic pseudocysts complicate up to 10% of acute and chronic pancreatitis cases, and up to 5% of pancreatic pseudocysts will bleed [5]. Endovascular treatment of pancreatitis-related vascular pseudoaneurysms is well-established. Management of ruptured and hemorrhagic pancreatic pseudocysts, however, has previously been thought to be almost exclusively surgical [7]. Even when endovascular treatments are considered, they are often used as a stabilizing procedure prior to surgery [6,8]. Postsurgical mortality rates associated with both hemorrhagic pancreatic pseudocysts and pseudoaneurysms are very high, ranging from 20% to 43% [5,9,10].

In the setting of anticoagulation-related hemorrhage into a pseudocyst without pancreatitis, no cases described in the literature underwent surgical intervention [2–4]. Given that there is no significant underlying pancreatic inflammation causing the hemorrhage, partial pancreatectomy or necrosectomy is not necessary. In patients who were hemodynamically stable, reversal of the anticoagulation alone was sufficient to stop the hemorrhage [2,3]. Chiu et al discussed 2 patients who presented with the appearance of masses within the pancreas that were small, contained, and mistaken for malignancy. In their series, hemorrhage stopped upon reversal of the anticoagulation alone [2]. Rigaux et al also described a patient who was on anticoagulation who presented with severe abdominal pain and developed a large intra- and extraperitoneal hemorrhage on imaging. Once again, the hemorrhage stopped with reversal of anticoagulation, and no interventions were necessary [3]. In the case reported by Hong et al, hemorrhage was reported through the ampulla of Vater, and the patient presented with a gastrointestinal hemorrhage and

hemodynamic instability [4]. Arteriography was performed, but no active extravasation was visualized, and no further therapy was performed. The patient died of cardiac arrest soon after.

Endovascular therapy of hemorrhages associated with pancreatic pseudocysts have become more prevalent in the scientific literature [8–11]. There are several benefits of embolization specifically in populations with anticoagulation-related bleeds, primarily due to the minimally invasive nature of embolization in this subset of patients who are deemed poor surgical candidates. Patients on anticoagulation for PE and DVT can also have IVC filters placed at the time of the embolization while in the IR suite to prevent worsening of pulmonary symptoms while recovering off of anticoagulation.

Embolization with coils, N-butyl cyanoacrylate, and microparticles have been used for endovascular treatment of pancreatitis related hemorrhages. Combinations of these therapies are also often used together. Small or tortuous vessels are often successfully treated with N-butyl cyanoacrylate when unable to be reached by coiling. Larger vessels, such as hemorrhage related to the splenic artery, have been treated successfully with covered stent placement to prevent splenic infarction. When a smaller vessel is visualized with active extravasation, aneurysm, or pseudoaneurysm, coil embolization is typically the preferred option for treatment if the vessel is easily accessed. Placement of coils distal to proximal helps to prevent bleeding from backflow or collateral vascular flow to the injured vessel. Rebleeding following embolization therapy has been widely variable in the literature, but recent studies have shown very low rates, most of which were successfully treated with repeat embolization [11].

Conclusion

Embolization of hemorrhage associated with bleeding and ruptured pancreatic pseudocyst is a reasonable option for treatment. In patients with anticoagulation-related hemorrhages, embolization has the potential to be first line therapy, as patients may be poor surgical candidates and will possibly require concomitant IVC filter placement given contraindications to use of anticoagulation in the acute clinical setting.

REFERENCES

[1] Shoeb M, Fang MC. Assessing bleeding risk in patients taking anticoagulants. J Thromb Thrombolysis 2013;35(3):312–19.
[2] Chiu K, Razack A, Maraveyas A. Isolated pancreatic heamorrhage in association with anticoagulation. Thromb J 2013;11(1):20.
[3] Rigaux J, Poreddy V, Al-Kawas F. Intraperitoneal and retroperitoneal hemorrhage associated with coumadin-induced bleeding into a pancreatic pseudocyst. Clin Gastroenterol Hepatol 2007;5(6):A32.
[4] Hong D, Gately JF, Heggtveit HA. Pancreatic pseudocyst: Heparin-induced haemorrhage through the ampulla of Vater. J R Coll Surg Edinb 1999;44(4):271–3.
[5] Balthazar EJ, Fisher LA. Hemorrhagic complications of pancreatitis: radiologic evaluation with emphasis on CT imaging. Pancreatology 2001;1(4):306–13.
[6] Okamura K, Ohara M, Kaneko T, Shirosaki T, Fujiwara A, Yamabuki T, et al. Pancreatic pseudocyst ruptured due to acute intracystic hemorrhage. Case Rep Gastroenterol 2017;11(3):755–62.
[7] Hsu JT, Yeh CN, Hung CF, Chen HM, Hwang TL, Jan YY, et al. Management and outcome of bleeding pseudoaneurysm associated with chronic pancreatitis. BMC Gastroenterol 2006;6:3.
[8] Jain SK, Rajendran V, Jain MK, Kori R. Hemorrhagic pseudocyst of pancreas treated with coil embolization of gastroduodenal artery: a case report and review of literature. Case Rep Surg 2015;2015:480605.
[9] Phillip V, Rasch S, Gaa J, Schmid RM, Algul H. Spontaneous bleeding in pancreatitis treated by transcatheter arterial coil embolization: a retrospective study. PLoS One 2013;8(8):e72903.
[10] Novacic K, Vidjak V, Suknaic S, Skopljanac A. Embolization of a large pancreatic pseudoaneurysm converted from pseudocyst (hemorrhagic pseudocyst). JOP 2008;9(3):317–21.
[11] Kim J, Shin JH, Yoon HK, Ko GY, Gwon DI, Kim EY, et al. Endovascular intervention for management of pancreatitis-related bleeding: a retrospective analysis of thirty-seven patients at a single institution. Diagn Interv Radiol 2015;21(2):140–7.