

Acute Portal Vein Thrombosis and Pancreatitis: An Adverse Complication of the Embolization of a Splenic Artery Aneurysm

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Abstract

A 45-year-old woman presented with few months history of left upper quadrant abdominal pain radiating to her left shoulder. Computed Tomographic Angiography (CTA) demonstrated two successive splenic artery aneurysms 2.2 and 2.8 cm in diameter in the distal splenic artery. Her symptomatic nature and the aneurysm's size necessitated proceeding with treatment. The aneurysms were treated by endovascular coil and thrombin embolization. A few hours post-procedure, she developed acute portal vein thrombosis (aPVT), followed by acute pancreatitis and near-total splenic infarction. Treatment with anticoagulant therapy and antibiotics led to a good recovery. She was discharged on warfarin therapy for 6 months. 40 days after embolization, an abdominal CTA revealed a patent portal vein, occlusion of the aneurysms and partial splenic infarction. We present an overview of the natural history, treatment options and side effects of treatment of splenic artery aneurysms.

Keywords: Splenic artery aneurysm; Abdominal CTA

Introduction

Splenic artery aneurysm is the most common type of visceral artery aneurysm [1], comprising 60% of all visceral artery aneurysms [2]. Their true prevalence in the general population is unknown, but estimates have ranged from 0.2-2.0% [3]. Although the prevalence is low, a high mortality rate of 29% is reported for intra-peritoneal rupture [4]. Incidental findings of splenic artery aneurysm have risen with the increased use of diagnostic imaging of other abdominal pathology [1,3,5]. The majority of aneurysms are solitary, small (<2 cm), saccular lesions found at a bifurcation of the middle or distal part of the splenic artery. 20% of cases are found as multiple lesions [1].

Pancreatitis may cause splenic artery pseudoaneurysms as a result of proteolytic degradation of the arterial wall by the release of pancreatic enzymes [6]. Because hormonal fluctuation is thought to contribute to the degradation of the interstitial layer, pregnant women and women of childbearing age have an increased risk for developing true splenic artery aneurysms [5]. Other associated risk factors for developing splenic artery aneurysm are atherosclerosis, portal hypertension and cirrhosis. Atherosclerosis is not thought to be the primary cause of aneurysm, as in the aorta. Rather, it is secondary to medial degeneration [3]. Fibromuscular dysplasia, infections and congenital abnormalities are rare causes [1]. In the past the gold standard in diagnosis was direct catheter angiography [3]. Currently CTA and MRA examination replaced former invasive catheter direct angiography.

The indications for treatment include symptoms (i.e. specific epigastric pain), a diameter >2 cm, pseudo aneurysm of any diameter, female sex, childbearing age, portal hypertension or scheduled liver transplantation [1,7]. Asymptomatic aneurysms or diameter <2 cm are eligible for conservative treatment and follow-up due to their low growth rate and smaller risk of rupture [4].

Historically, surgical intervention was the treatment of choice. Surgery included aneurysm ligation, aneurysmectomy with revascularization, or splenectomy [5]. Surgery has a mortality of approximately 1%, but the rate is much higher if pancreatitis is present [1]. With the advancement of endovascular approaches, surgery is now more often reserved for unique cases or cases in where endovascular treatment has failed. Covered stents for the exclusion of the aneurysm sac, trans-catheter embolization and coil or thrombin injection form current accepted treatment strategies with high technical success. [5,8]. These procedures have lowered the morbidity and mortality rate

compared to surgery and have, therefore, been increasingly used in contemporary management of splenic artery aneurysms [4,5]. Long term endovascular outcomes should include a decrease in aneurysm diameter [4]. Complications of splenic artery embolization include postoperative splenic infarction and insufficiency, which might necessitate splenectomy. Incomplete embolization or covered-stent endo-leak resumes the risk of rupture and requires re-intervention [5]. Other complications include post-embolization syndrome (fever, nausea, vomiting and pain) [9], pancreatitis, splenic vein thrombosis, infection, rupture of pseudoaneurysm, and abscess [1]. Follow up imaging (Ultrasound Doppler (US-D) or CTA) at 1 and 6 months is recommended [3]. CTA or Magnetic Resonance Angiography MRA is the most accurate diagnostic tools for the diagnosis and planning treatment. Overall, endovascular treatment is less invasive and, therefore, preferable to conventional surgery. Furthermore, acute portal vein thrombosis, while exceedingly rare, should be considered as one of the potential complications of the endovascular embolization.

Case Report

A 45-year-old woman underwent evaluation for long standing (few months) left upper quadrant abdominal pain radiating to the left chest and shoulder. After excluding myocardial origin (history, electrocardiogram, cardiac enzymes) or upper gastrointestinal origin (gastroscopy), she was evaluated by imaging, including upper abdominal ultrasonography (US), Chest Computed Tomography (CT), and Abdominal CT. They were all normal except for two liver lesions suspected to be haemangioma, a pericardial effusion and calcified, dilated veins in the hilum of the spleen. Abdominal CTA revealed two splenic artery aneurysms, measuring 2.2 cm and 2.8 cm in diameter

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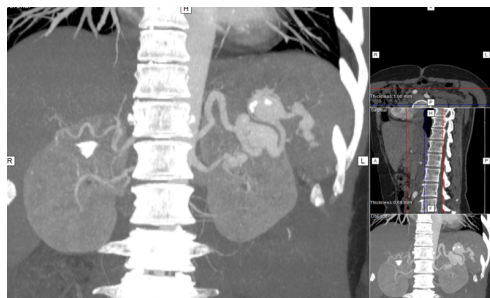


Figure 1: CTA demonstrating two aneurysms in splenic artery.



Figure 2: Angiography before embolization.

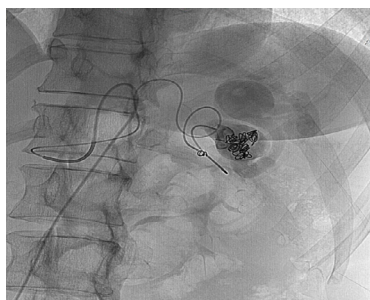


Figure 3: Coil insertion without sealing of the artery.

(Figure 1). The patient's age, aneurysm size, and symptoms dictated treatment.

Endovascular treatment via a femoral approach failed to pass a stiff guide wire through the tortuous and aneurysmal vessel. Therefore, coil and thrombin embolization of the aneurysms were combined. On completion angiogram, the artery was fully occluded (Figures 2-5).

A few hours post-procedure, the patient developed severe abdominal pain. On physical examination, she had diffuse abdominal tenderness without peritoneal irritation. Her white cell blood count was $18,300/\text{mm}^3$ with left shift. CTA demonstrated thrombosis of the splenic vein extending into the portal vein, non-homogenic liver tissue suspected to be ischemic and infarction of the spleen (Figure 6). The patient was started on anticoagulation therapy, intra-venous antibiotics, fluids and oral analgesics. On the following day, she developed hyper-amylasaemia (288 U/L) and deranged liver function tests. On the fourth post-procedural day, she developed fever. Five days post-procedure, she had another CTA that demonstrated bilateral pleural effusion, splenic infarction, hypodense lesions in the right and left lobes of the liver, an oedematous pancreas with peri-pancreatic and

pelvic fluid, and the persistent portal vein thrombosis (Figure 7). The patient was treated conservatively with successful pain management, resolution of the fever and return to normal values of liver enzymes, white blood cells, and amylase.

Outcome and Follow-Up

Follow up CTA, 40 days after discharge, revealed a patent portal vein, partial splenic infarction, a small amount of pleural effusion and closure of the two aneurysms (Figure 8). The patient remained on Warfarin therapy for 6 months without any complication or complaint. The patient regained her ability to work one month after the procedure and returned to normal activity. She remains well after 15 months outpatient follow-up.

Discussion

In other reported cases, splenic artery aneurysm-associated acute portal vein thrombosis was due to the local compression of the splenic vein by the arterial aneurysm. Another difference is presentation prior to intervention, and not as a complication to the intervention [10-13]. We have presented a rare case in which the splenic vein thrombosis (from embolization of the splenic artery) extended into the portal



Figure 4: Embolization with thrombin injection.



Figure 5: Angiography after embolization showing closure of the aneurysms.



Figure 6: CTA the evening of the endovascular treatment showing thrombus in portal vein.

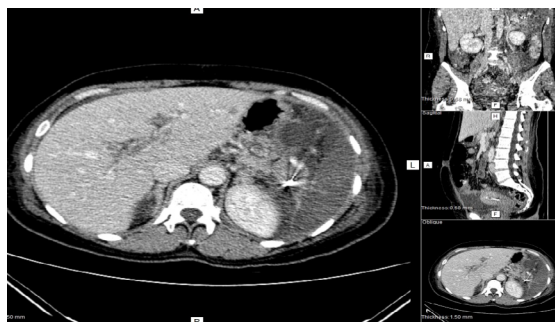


Figure 7: CTA 5 days after the endovascular treatment showing thrombus in portal vein.



Figure 8: CTA 40 days after the endovascular treatment showing patent portal vein.

vein. Although the thrombosis of the splenic vein is a seen outcome of splenic artery embolization, the pathophysiology of the extension into the portal vein is unknown.

Learning points/take home messages

1. CTA and MRA are accurate non-invasive diagnostic tools for splenic artery aneurysm.
2. Acute portal vein thrombosis is a rare complication of splenic artery aneurysm embolization and may be managed conservatively.

3. Acute pancreatitis may be a complication of splenic artery aneurysm embolization.

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