



A Case of Ruptured Inferior Pancreaticoduodenal Artery Aneurysm due to Median Arcuate Ligament Compression

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Abstract

Inferior pancreaticoduodenal artery aneurysms are rare, comprising approximately 2% of splanchnic aneurysms. These aneurysms are more often due to celiac stenosis from atherosclerosis but can also be due to median arcuate ligament syndrome. We report the case of a 68-year-old female with a history of unease with eating, who presented with retroperitoneal hemorrhage of unknown origin. CT angiography revealed a ruptured inferior pancreaticoduodenal artery aneurysm and celiac artery compression with the characteristic “hook” appearance, consistent with median arcuate ligament compression. The ruptured IPDA aneurysm was managed with endovascular coil embolization and the patient was discharged hemodynamically stable with stabilized hematocrits.

Case Presentation

68F with history of hypertension, hypothyroidism, migraines, hemorrhoids, and unease with eating, presented with 3 days of abdominal pain and bloody stools. The pain was located in the epigastrium, was 10/10 in severity, and associated with several episodes of bright red blood per rectum and one syncopal episode. Of note, the patient endorsed “unease with eating” that resulted in decreased intake for 8-9 months. She attributed this to stress from an ongoing divorce. She also reported a long history of “problems with gas” for which she takes over the counter medications. The patient denied any aspirin or anticoagulant use.

In the ER, her vitals were normal. On exam, she appeared fatigued however in no acute distress. Her abdomen was soft, non-distended. She was noted to have tenderness in the epigastrium and left lower quadrant however there was no rebound or guarding. On digital rectal exam, there was gross blood, no internal hemorrhoid, sphincter tone was normal, external hemorrhoids were present, non-thrombosed and non-bleeding. Her initial hematocrit was 42, however after 1L of crystalloid, downtrended to 35 and continued to downtrend to as low as 26 within 24 hours. Otherwise, her lactate level was normal as well as her lipase.

CT of the abdomen and pelvis with IV and PO contrast obtained during workup in the ER revealed retroperitoneal hemorrhage with extensive retroperitoneal induration which was higher attenuation than simple fluid measuring on the order 50 Hounsfield units centered about the pancreas (Figure 1). Additionally, there was colitis from the transverse colon to the descending colon. Surgery was consulted and the decision was made to obtain a CT angiogram of the abdomen and pelvis. This revealed a ruptured inferior pancreaticoduodenal artery aneurysm (Figure 2 and 3) as well as kinked and hooked appearance of the celiac origin in the absence of significant atherosclerotic disease raising the possibility of median arcuate syndrome (Figure 4).

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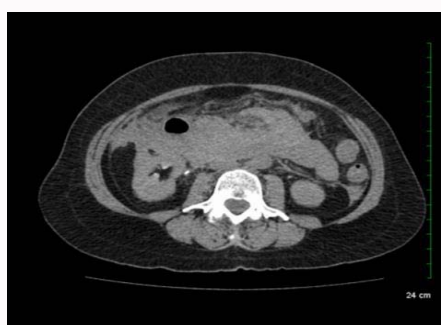


Figure 1: CT abdomen and pelvis with IV contrast showing retroperitoneal hemorrhage.

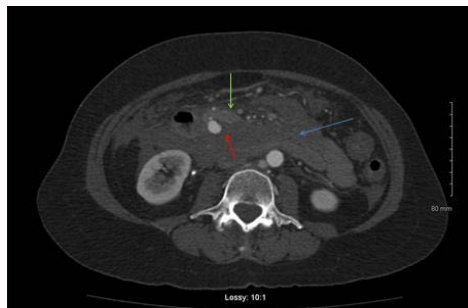


Figure 2: CTA (arterial phase) Blue: large complex fluid collection displacing the pancreas (green arrow) anteriorly thus confirming a retroperitoneal space location. Green: head/neck of the pancreas. Red: lobular clearly delineated enhancement posterior to the pancreatic head with a density that follows the aortic blood pool.



Figure 3: CTA (arterial phase). The complex collection measures 39-85 Hounsfield units, highly suggestive of blood products. The lobular region of enhancement measures 11mm. Given its location with respect to the pancreatic head, and that it follows the aortic blood pool, it suggests posterior branch inferior pancreaticoduodenal artery aneurysm.



Figure 4: Sagittal CT angiogram (arterial phase): Kinked and hooked appearance of the celiac origin in the absence of significant atherosclerotic disease raises the possibility of median arcuate syndrome.

Given this diagnosis, the patient underwent a diagnostic visceral angiogram with subsequent embolization of the inferior pancreaticoduodenal artery aneurysm. The left radial artery was accessed with a 21 gauge micro needle and ultrasound guidance. A wire was placed through the needle and a 5F hydrophilic glidesheath was advanced over the wire. The complex collection measures 39-85 Hounsfield units, highly suggestive of blood products. A .035 wire and 5F diagnostic catheter was used to navigate through the arm and into the descending aorta. A 5F Sarah Radial catheter was used to selectively catheterize the SMA and a micro catheter system was used to catheterize the posterior branch of the inferior pancreaticoduodenal artery. Coil embolization was used to occlude the artery distal to the aneurysm and the aneurysm sac. After the procedure, the patient was monitored in the surgical intensive care unit (SICU) for two days. She tolerated a regular diet after two days

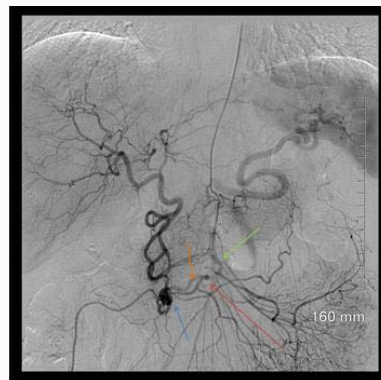


Figure 5: Arterial phase angiogram with catheter in the SMA. Green: Superior Mesenteric Artery. Red: Origin of the inferior pancreaticoduodenal artery. Blue arrow: Aneurysm seen arising from the posterior branch of the inferior pancreaticoduodenal artery (when correlated with CTA performed earlier). Orange: Anterior division of the PDA.

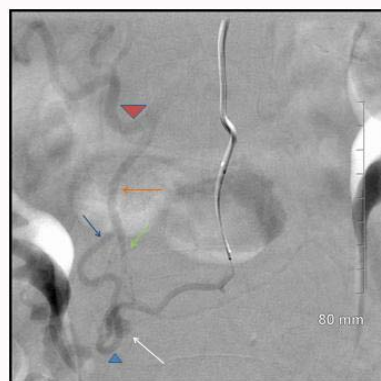


Figure 6: Arterial Phase Angiogram with catheter at the origin of the Inferior PDA. Red arrowhead: Common hepatic Artery. Red arrow: Gastroduodenal artery. Blue arrow: Posterior superior PDA. Green arrow: Anterior superior PDA. White arrow: Aneurysm from the posterior inferior PDA. Blue arrowhead: Posterior inferior PDA. Selective opacification of the anterior and posterior branches of the Inferior PDA. Inferior PDA anastomosis with the Superior PDA (arising from GDA) are well seen in this image.

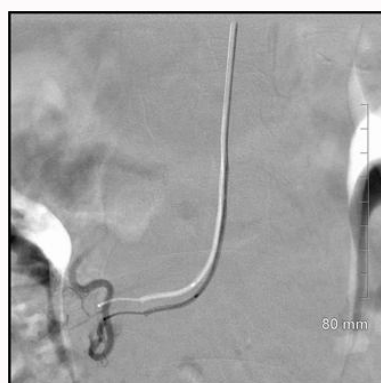


Figure 7: Catheter advanced distally into the posterior branch PDA, distal to the aneurysm sac.

and no longer had bright red blood per rectum. Her hematocrit was stable, abdominal pain improved, and she was discharged with plans for follow-up (Figure 5-9).

Discussion

Inferior Pancreaticoduodenal artery aneurysms are very



Figure 8: Coils deployed distal to aneurysm sac in the posterior inferior PDA.



Figure 9: Coils now fill the majority of the aneurysm sac. Contrast is no longer seen distal to the embolized portion confirming complete embolization.

rare, comprising only 2% of visceral aneurysms. Inferior pancreaticoduodenal artery aneurysms are more frequently identified given the increase in diagnostic radiographic testing such as computed tomography (CT) and magnetic resonance imaging (MRI). Inferior pancreaticoduodenal artery (IPDA) aneurysms when symptomatic can present with rupture, and in-hospital mortality for patients not treated with ruptured inferior pancreaticoduodenal artery aneurysm rupture approaches 80%.

True aneurysms of the pancreaticoduodenal arteries are distinguished from false aneurysms on the basis of etiology and location of the bleeding. With respect to location of bleeding, true aneurysms rupture into the retroperitoneal space whereas false IPDA aneurysms rupture into the abdomen. True inferior pancreaticoduodenal artery aneurysms are often secondary to celiac stenosis, either by atherosclerosis or extrinsic compression from the median arcuate ligament. In contrast, false IPDA aneurysms occur in patients with recent surgery, trauma, pancreatitis, or with septic emboli [1].

Patients with celiac stenosis may develop aneurysms of the pancreaticoduodenal arcade. The hypertension that results distally to the stenosis leads to aneurysmal dilation of the pancreaticoduodenal arcades. Extrinsic compression of the celiac artery can result in median arcuate syndrome, which is a rare condition which comprises clinical manifestations e.g. postprandial pain and celiac stenosis. The median arcuate ligament is a fibrous band that connects both sides of the diaphragmatic crura. In most people, the median arcuate ligament passes superior to the celiac axis. However, in a minority of patients, the median arcuate ligament passes much lower and anterior to the celiac artery and causes compression. Median arcuate syndrome consists of post-prandial abdominal pain associated with 5-10 lb. weight loss. The syndrome, while in part due to stenosis, most likely has a neuropathic origin as well. Celiac stenosis, alone, is unlikely the cause, since 47% of patients continue to have recurrence of symptoms with celiac revascularization alone. In contrast, only 21% of patients have recurrence with revascularization and surgical release of the ligament [2].

Median arcuate ligament syndrome is best visualized with CT angiography where the sagittal view is preferred. With conventional angiography, the region of narrowing is better identified during expiration whereas it improves with inspiration. 13-50% of healthy patients will have extrinsic compression of the celiac artery due to the median arcuate ligament. However, only 10-24% of patients with extrinsic compression of the celiac by the median arcuate ligament will have the syndrome [3].

The goal for our patient during this admission was to control the bleeding. She was hemodynamically stable and therefore a prime candidate for endovascular coil embolization of the IPDA aneurysm. She will need further workup of her previous abdominal pain symptoms and possibly release and revascularization of the celiac axis [4].

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