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Gastroduodenal Artery Pseudoaneurysm

Clinical History:

76 year old male presents with acute-on-chronic abdominal pain and melena.

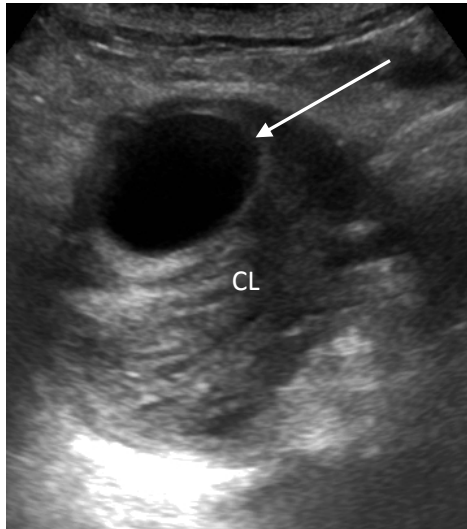


Figure 1. Grayscale transverse ultrasound through the mid abdomen demonstrates a round anechoic structure (arrow) with posterior through transmission. There is a complex collection with mixed echogenicity surrounding this area representing clotted blood (CL).

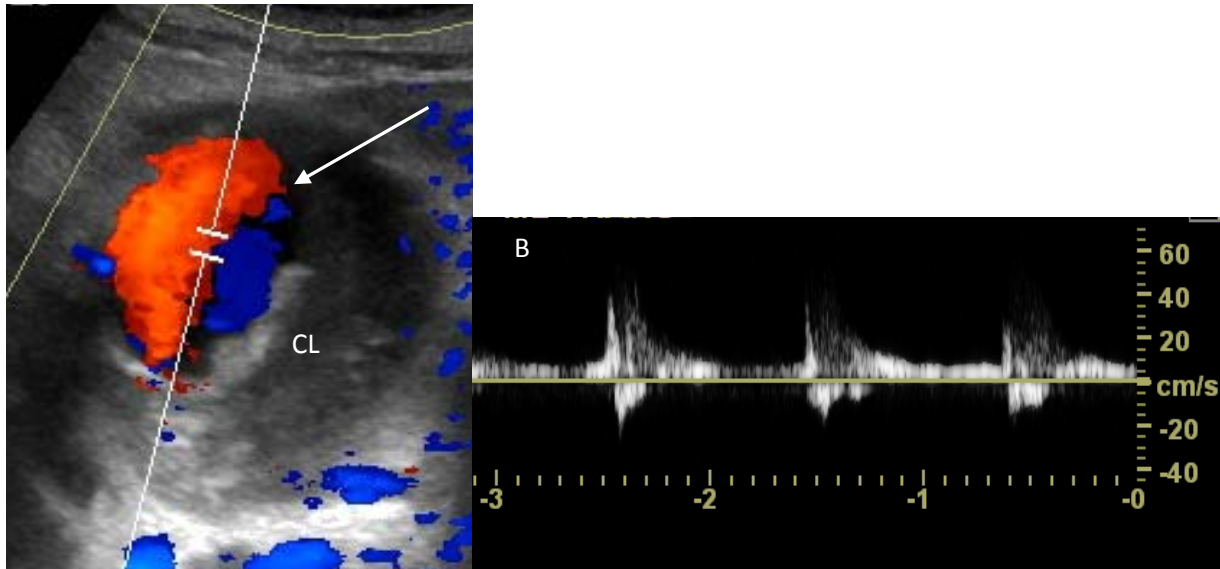


Figure 2. Transverse color Doppler ultrasound (a) and spectral tracing (b) show bidirectional vascular flow within the structure. (CL = clotted blood)



Figure 3. Reformatted sagittal computed tomography (a) and conventional angiography (b) images of the upper abdomen were obtained following the initial ultrasound, confirming the finding of a gastroduodenal artery pseudoaneurysm (PA). (AS = ascites; C = pancreatic parenchymal calcifications; G = left gastric artery; IVC = inferior vena cava; L = liver; PA = pseudoaneurysm; CH = common hepatic artery; S = splenic artery; "Arrow" = pseudoaneurysm neck)

Diagnosis: Pseudoaneurysm of the Gastroduodenal Artery

Discussion:

Pseudaneurysms (PA) represent contained ruptures following injury to one or more layers of a vascular wall. PAs are a complication of acute pancreatitis (6-9.5% of cases) and result from lysis of an arterial wall by pancreatic enzymes or erosion of the wall by pre-existing pancreatic pseudocysts.^{1,2} The lumen then continues to increase in size at variable rates with an impending risk of rupture. Additionally, gastrointestinal blood loss can occur if the pseudoaneurysm forms a fistula with the biliary or pancreatic ducts. Mortality rates nearing 100% have been reported following visceral PA rupture.³ The potential for rapid growth and high mortality rates underscore the importance of early diagnosis and prompt intervention.

Ultrasound is a cost effective imaging modality used to evaluate the 4 main characteristics of a pseudoaneurysm: (1) Neck; (2) Waveform; (3) Size; and (4) Location.

The neck is a communication between the vessel lumen and contained sac, which can be difficult to demonstrate by ultrasound for visceral artery PAs. Cross sectional imaging or conventional angiography may be used to identify the PA neck (Figure 3) when ultrasound cannot.

The classic waveform (Figure 2b) is bidirectional, evidenced by flow moving in opposite directions (Figure 2a) through the sac. This is known as the Yin and Yang sign. Additionally, a To and Fro pattern on spectral Doppler is observed in the neck of the pseudoaneurysm. Color Doppler ultrasound may be used to diagnose pseudoaneurysms on this basis or to monitor for recurrence following therapy.³

Size and location of the PA are important prognostic and therapeutic parameters. Sac size ≥ 2 vessel diameters has been used as a cutoff for visceral artery PA intervention given their high mortality rates following rupture.⁴ PA location also predicts rupture and guides the surgical or interventional therapeutic approach. Pancreatic pseudoaneurysms most commonly arise in the splenic artery, followed by the gastric and hepatic arteries.⁵ These splenic artery PAs are especially prone to rupture during pregnancy.

Angiographic, ultrasound guided and surgical techniques may be employed in the management of pancreatic PAs. Endovascular therapies are often favored over surgery given their less invasive approach and lower rate of complications.³ PAs of visceral arteries with significant collateral flow are embolized with coils (narrow necks) or a combination of catheter directed embolization and covered stent placement (broad necks). More recently, successful treatment of visceral PAs using percutaneous or endoscopic ultrasound-guided thrombin injection has been described.^{6,7}

References

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