AMSER IR Case of the Month November 2023

A 48-year-old male s/p Whipple presents with abdominal tenderness after a syncopal episode

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Patient Presentation

HPI: 48-year-old male with a past medical history of pancreatic adenocarcinoma s/p Whipple three years prior complicated by multiple recurrences and gastrojejunal stricture s/p stenting, presents to the ED with abdominal tenderness after a syncopal episode with loss of consciousness.

PMHx: Pancreatic adenocarcinoma, chemotherapy-induced neuropathy

PSHx: Whipple, cholecystectomy, include stent procedure of gastrojejunostomy

Family Hx: Prostate cancer (father)

Social Hx: Not significant

Pertinent Labs on Presentation

- CBC: WBC 12.48, RBC 3.62, Hgb 10.6, Hct 31.9
- CMP: ALP 177, AST 160, ALT 70, Lactic acid 3.9, Lipase 5, Glucose 159, Albumin 3.3

Remaining lab values within normal limits

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 4: **Acute nonlocalized abdominal pain. Not otherwise specified. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
CT abdomen and pelvis without IV contrast	Usually Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	Usually Appropriate	O
US abdomen	May Be Appropriate	O
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
Radiography abdomen	May Be Appropriate	☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢
WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Nuclear medicine scan gallbladder	Usually Not Appropriate	☢☢
Fluoroscopy upper GI series with small bowel follow-through	Usually Not Appropriate	☢☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢

Ordered initially by ED during abdominal pain workup

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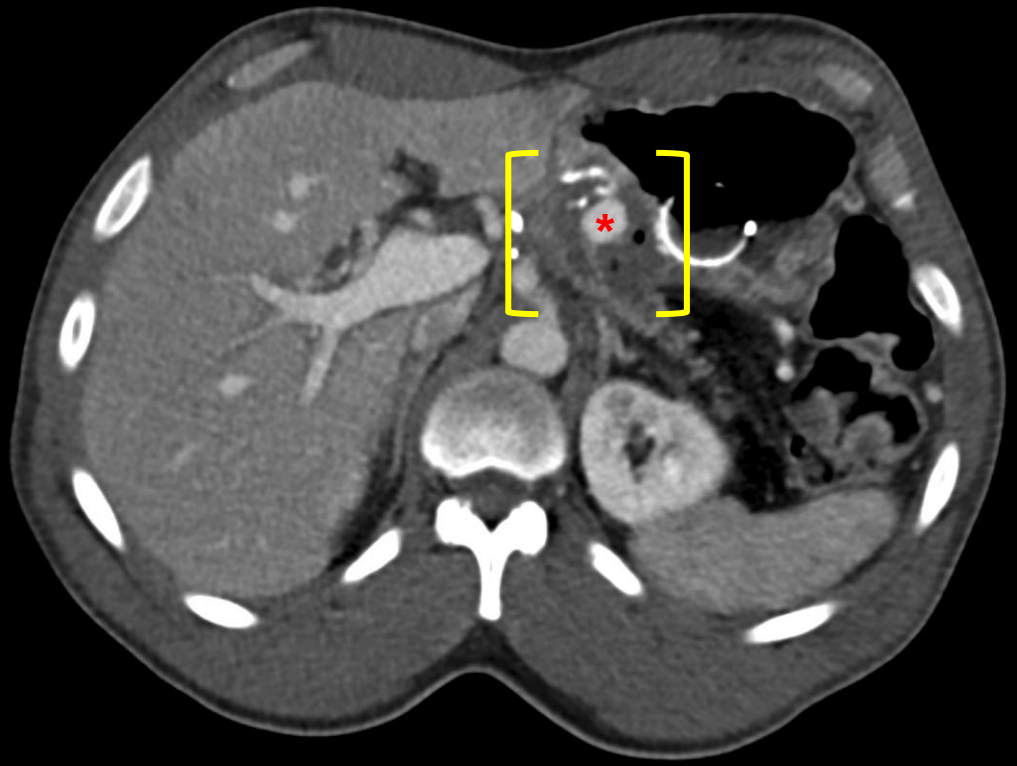
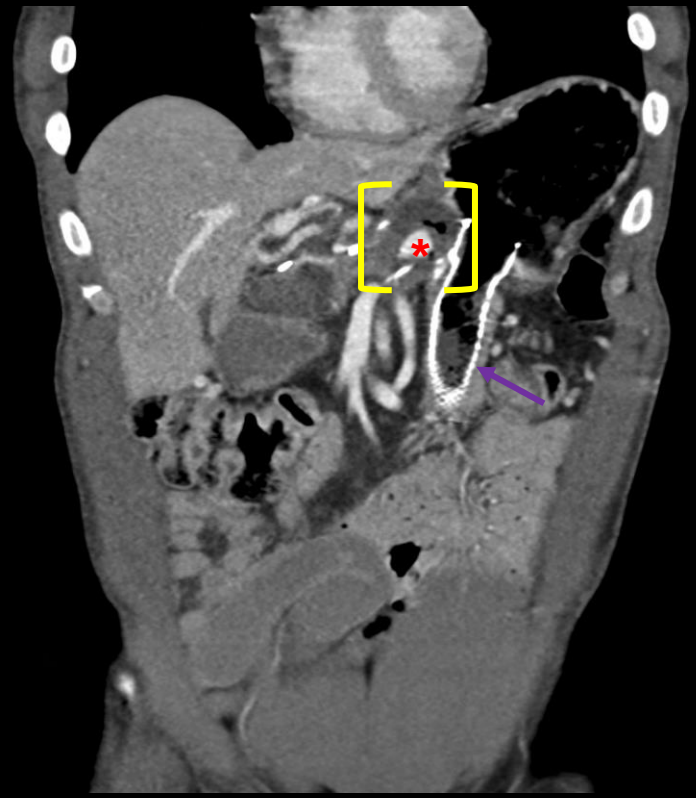
CT AP w/ contrast (unlabeled)

CT AP w/ contrast (labeled)



Axial section of contrast enhanced CT showing dehiscence of the pancreatojejunostomy with a 4.2 x 3.5 cm gas and fluid collection at the anastomosis site (yellow) and a 1.6 cm bleeding pseudoaneurysm within the collection (red).



Coronal section of contrast enhanced CT showing dehiscence of the pancreatojejunostomy with a 4.2 x 3.5 cm gas and fluid collection at the anastomosis site (yellow) and a 1.6 cm bleeding pseudoaneurysm within the collection (red). Metal stent across the gastrojejunostomy (purple).

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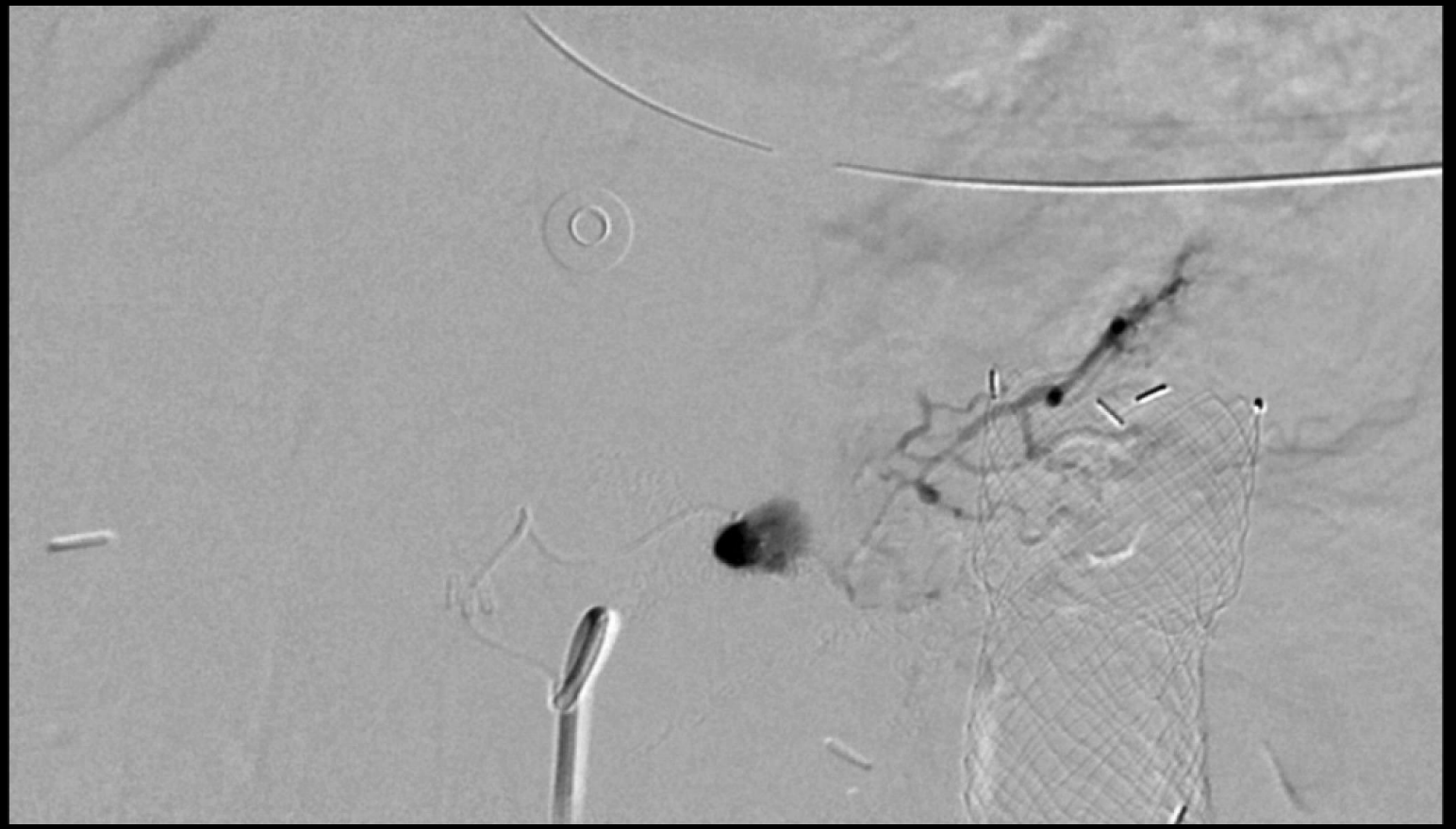
Angiogram (unlabeled)

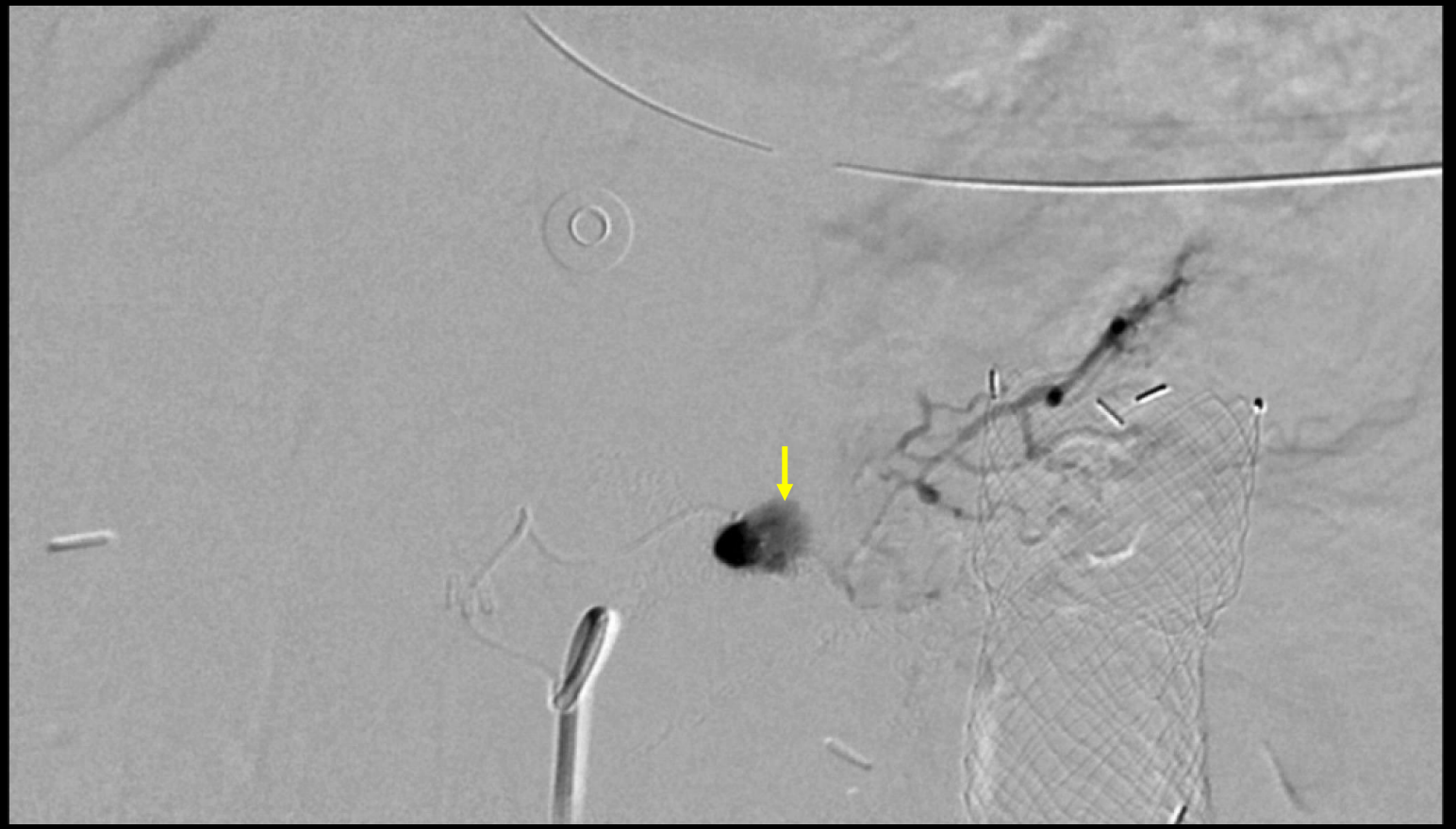
Angiogram (labeled)

Delayed-filling pseudoaneurysm arising from the proximal splenic artery (yellow) due to severe vasospasm at pseudoaneurysm neck (red) and adjacent areas of vasospasm.

Angiogram (unlabeled)

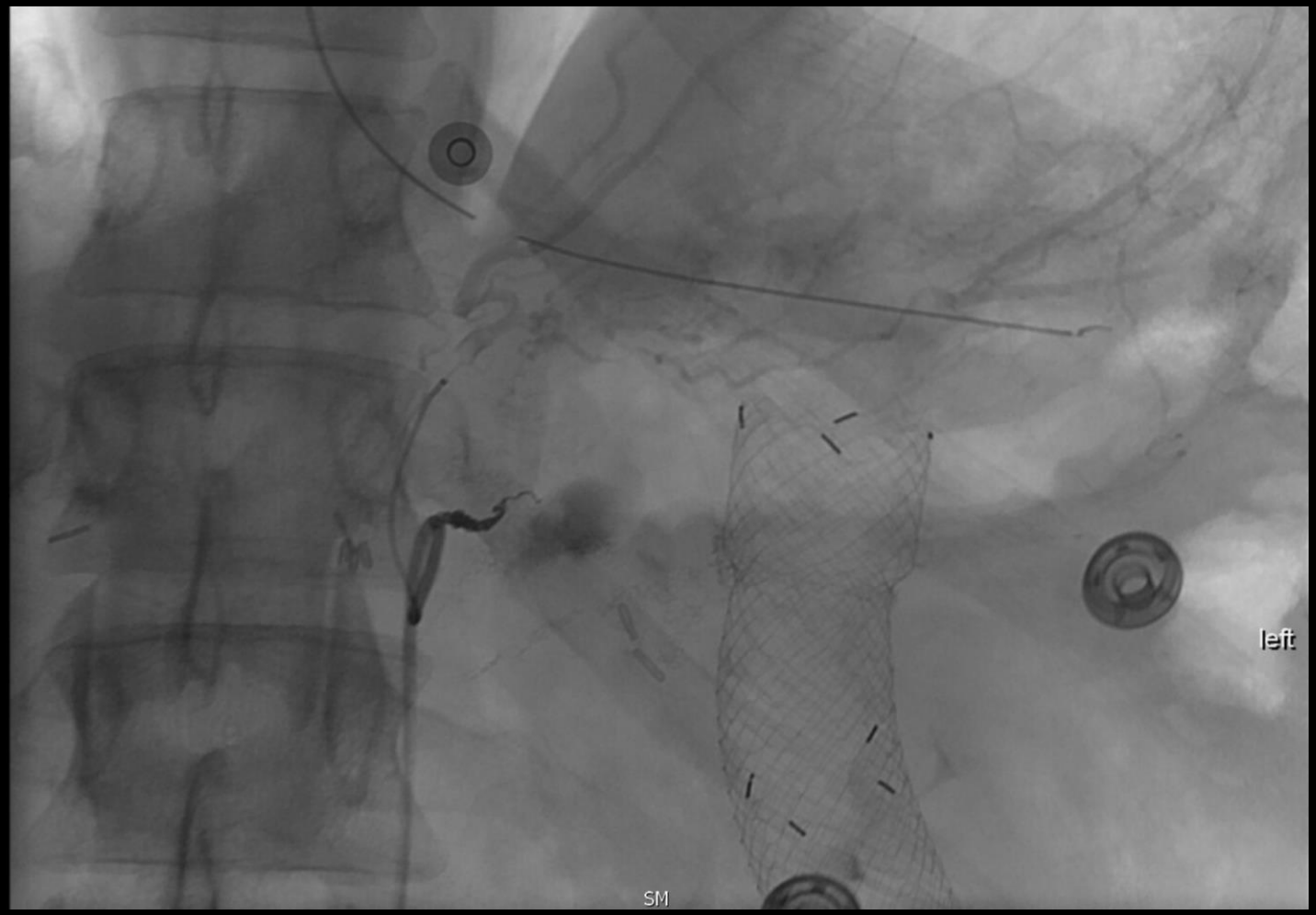


Angiogram (labeled)



Active extravasation from pseudoaneurysm arising from the proximal splenic artery (yellow).

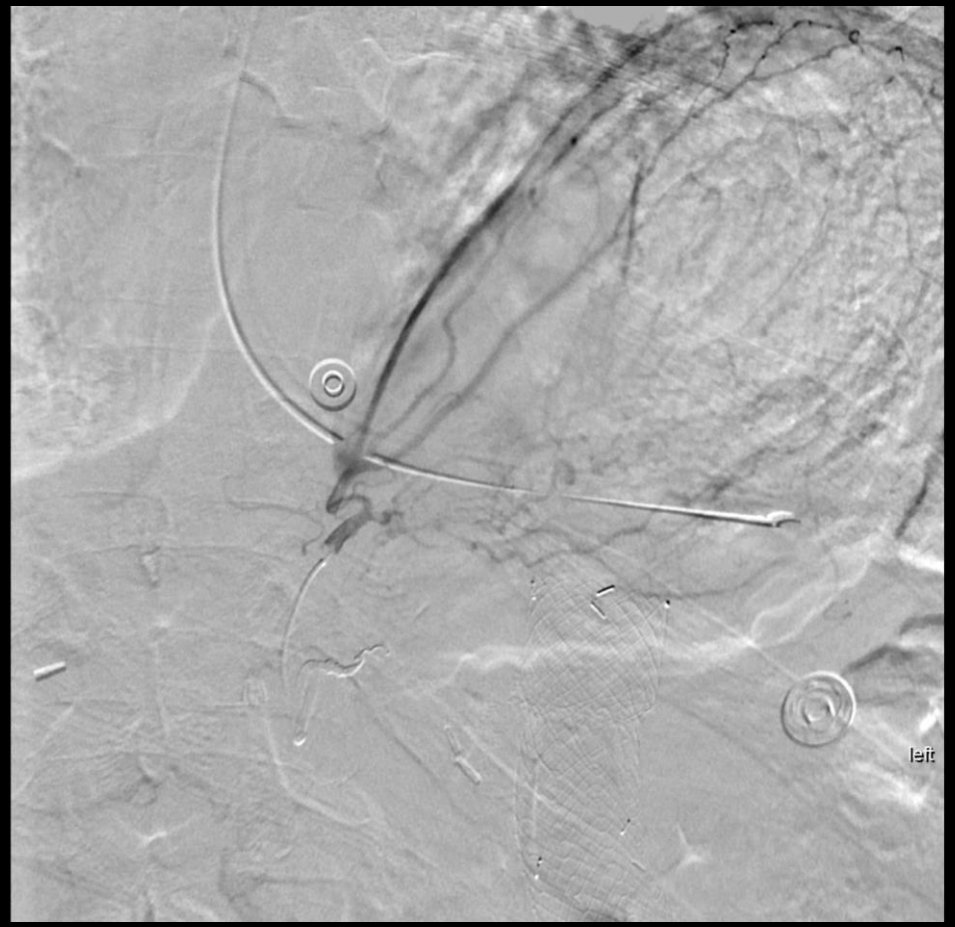
Angiogram (unlabeled)

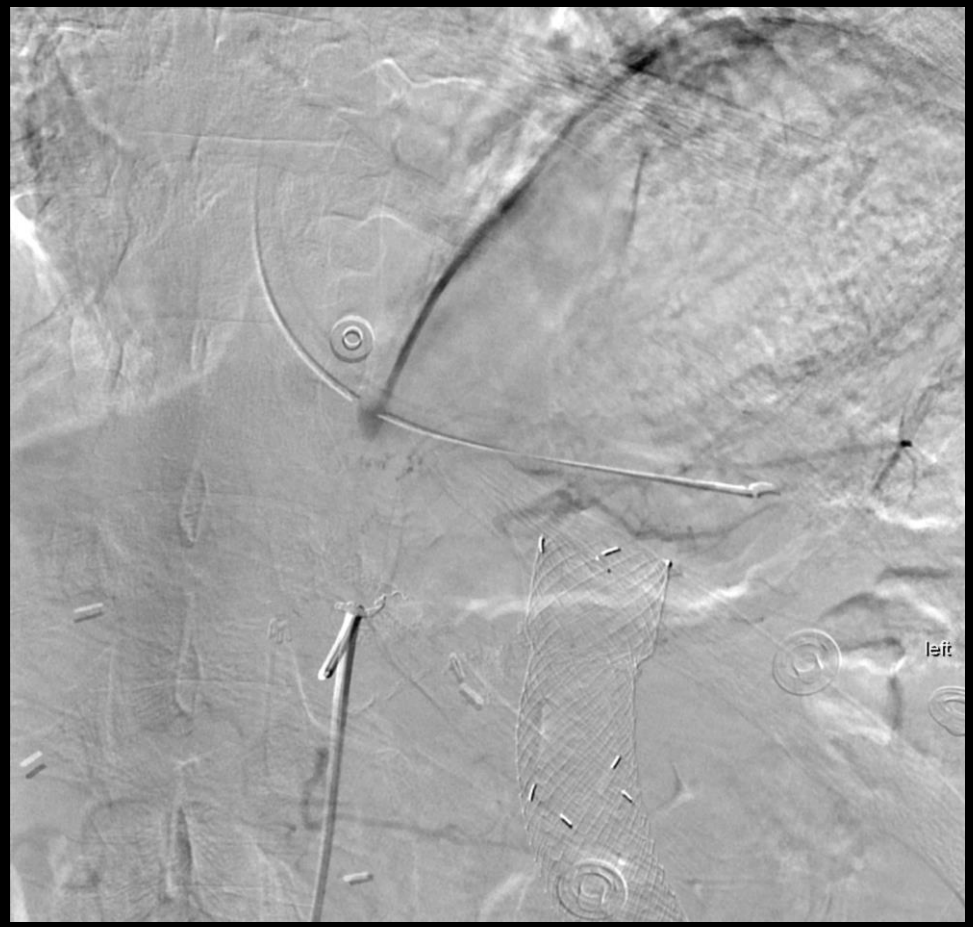


Angiogram (labeled)

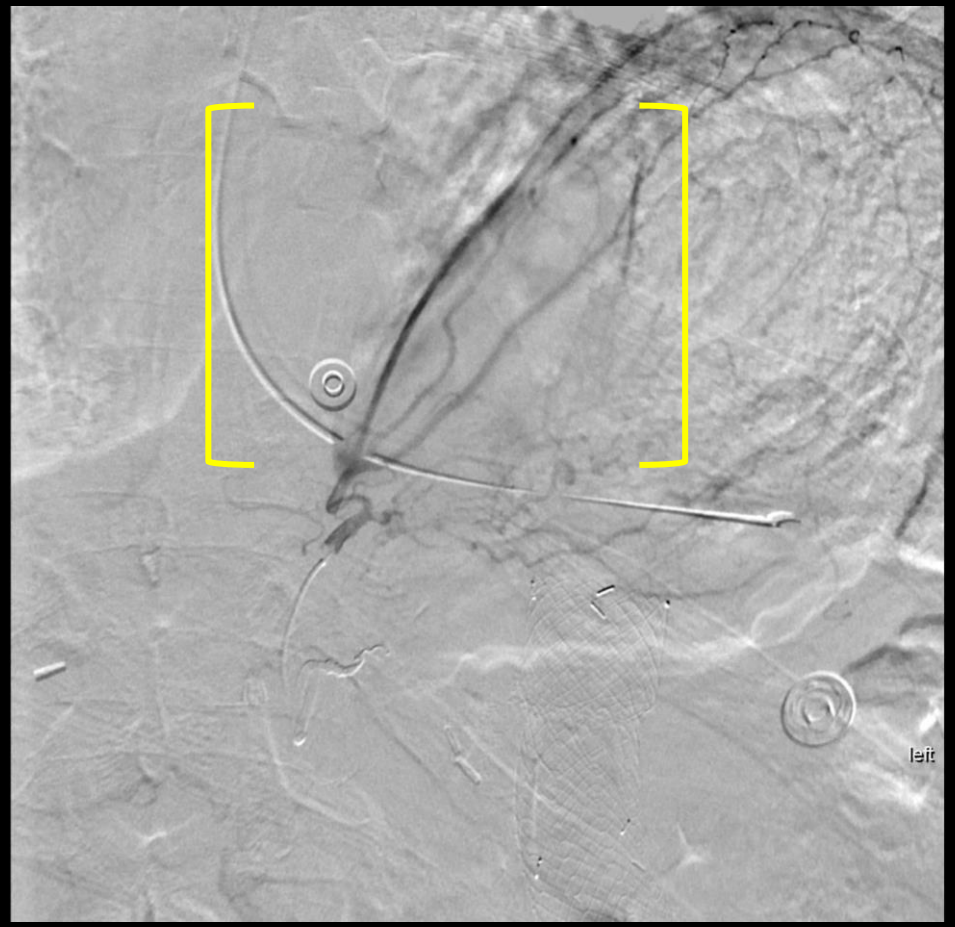
Microcatheter coil embolization performed at the pseudoaneurysm neck extending to the proximal splenic artery using detachable coils (Ruby LP coils, Penumbra, Alameda, CA) (yellow). Angiography shows hemostasis and no further pseudoaneurysm filling.

Angiogram (unlabeled)

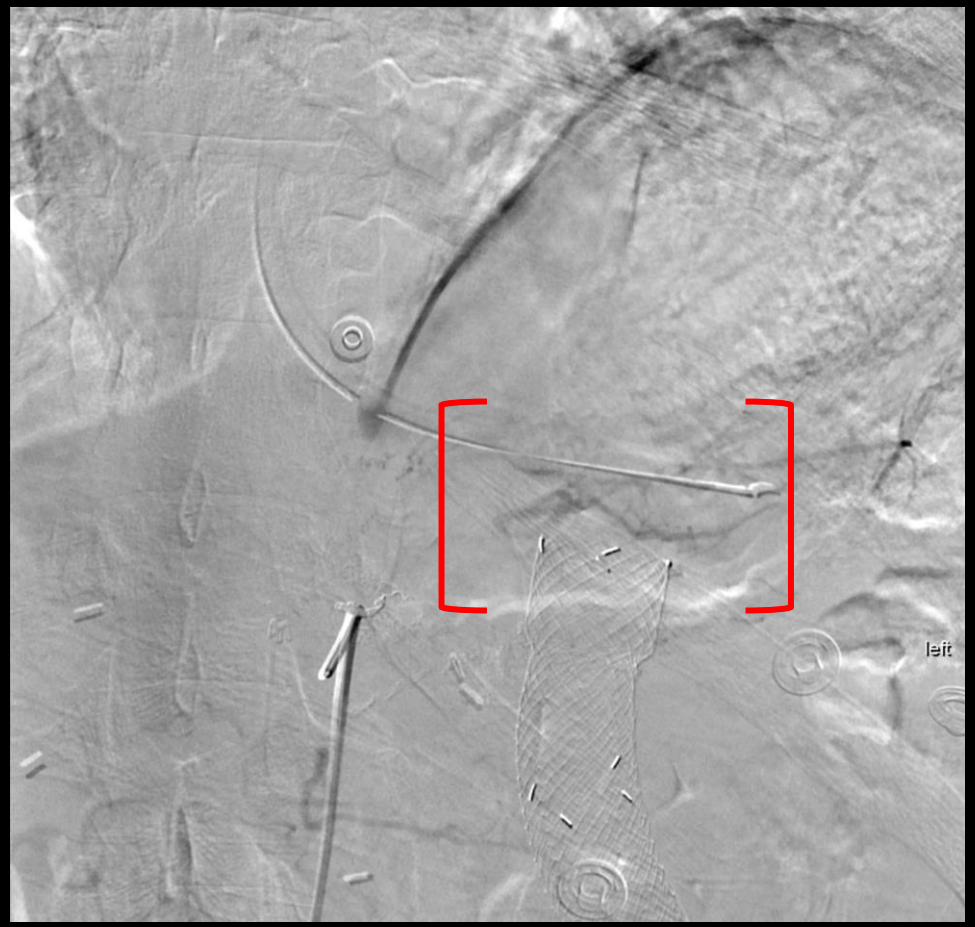




Angiogram (labeled)



Cannulated left gastric artery with angiography showing no active extravasation or pseudoaneurysm formation in this territory (yellow).



Completion celiac angiogram showing very delayed filling of the distal splenic artery via the short gastric arteries (red).

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Final Dx:

Splenic artery pseudoaneurysm s/p coil embolization

Case Discussion

- Epidemiology
  - Splenic artery pseudoaneurysms are typically associated with pancreatic pathologies: acute pancreatitis, chronic pancreatitis, pseudocyst
  - Up to 90% mortality rate if rupture is untreated
  - Rupture rate of 3.2% demonstrated by Ding et al. 2011

- Classic Patient Presentation
  - Splenic artery pseudoaneurysms are typically symptomatic and associated with diffuse abdominal tenderness and bleeding
  - True aneurysms are typically asymptomatic and found incidentally

Case Discussion

- Pathophysiology
  - Leakage of pancreatic enzymes degrades and weakens the outer arterial externa layer, allowing for medial and intimal enlargement
  - CT w/ contrast in this patient suggested dehiscence of the pancreatojejunostomy anastomosis site, which likely contributed to pseudoaneurysm formation

Case Discussion

- Management
  - Treatment is required regardless of pseudoaneurysm size due to high risk of rupture
    - Versus true splenic artery aneurysms are only treated when diameter is >2.5 cm
  - Hemodynamically stable patients
    - Endovascular interventions (embolization or stent-graft placement) are favored
    - Xu et al. 2020 demonstrated a 94% success rate with coil embolization
    - Risk of ischemia or tissue necrosis to organ supplied by embolized artery
  - Hemodynamically unstable patients
    - Open surgical repair is indicated
    - May be difficult to achieve hemostasis due to postsurgical adhesions or critical condition

Case Discussion (cont.)

- Management Options:
  - Embolization of splenic artery proximal (front door) and distal (back door) to the pseudoaneurysm (sandwich method)
    - Advantage is prevention of back filling of pseudo a. from potentially reversed flow from distal splenic artery
    - Disadvantage is difficulty is finding the back door
  - Endovascular Sac embolization
    - Advantage is potentially preserved flow to the splenic artery
    - Disadvantage is longer time to occlude sac and cost as more coils are necessary, and sac rupture is possible
  - Direct sac puncture and embolization with glue or other embolic
    - This is used when the target cannot be accessed via endovascular route
    - Disadvantage is technical challenge and risk of perforation of sac during n placement.

References:

American College of Radiology. ACR Appropriateness Criteria®. Available at https://acsearch.acr.org/list . Accessed September 20, 2023

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Xu, H., Jing, C., Zhou, J., Min, X., Zhao, J., Yang, L., & Ren, Y. (2020). Clinical efficacy of coil embolization in treating pseudoaneurysm post-Whipple operation. *Experimental and Therapeutic Medicine*, *20*(5), 37. https://doi.org/10.3892/etm.2020.9164