AMSER Case of the Month October 2020

69-year old male status post abdominal surgery presenting after unwitnessed fall

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Patient Presentation

- HPI: 69 yo M with, notably, adenocarcinoma of the pancreatic head, biliary stricture s/p biliary stent on post-op day 2 after gastrojejunostomy, was found unresponsive after an unwitnessed fall.
- PMH: extensive*
- PSH: prior liver embolization and biliary stent

*Additionally, patient has a history of HIV, tongue SCC s/p resection/reconstruction, chronic pancreatitis, non-Hodgkin's lymphoma in remission s/p chemotherapy, non-ischemic cardiomyopathy with ICD. CKD.

Pertinent Labs

- Labs obtained during trauma protocol:
  - Lactate 5.2 -> 3.1 (on repeat 40 minutes later)
  - ABG: pH 7.2; pCO2 58; pO2 49; Bicarb 23.7

What Imaging Should We Order?

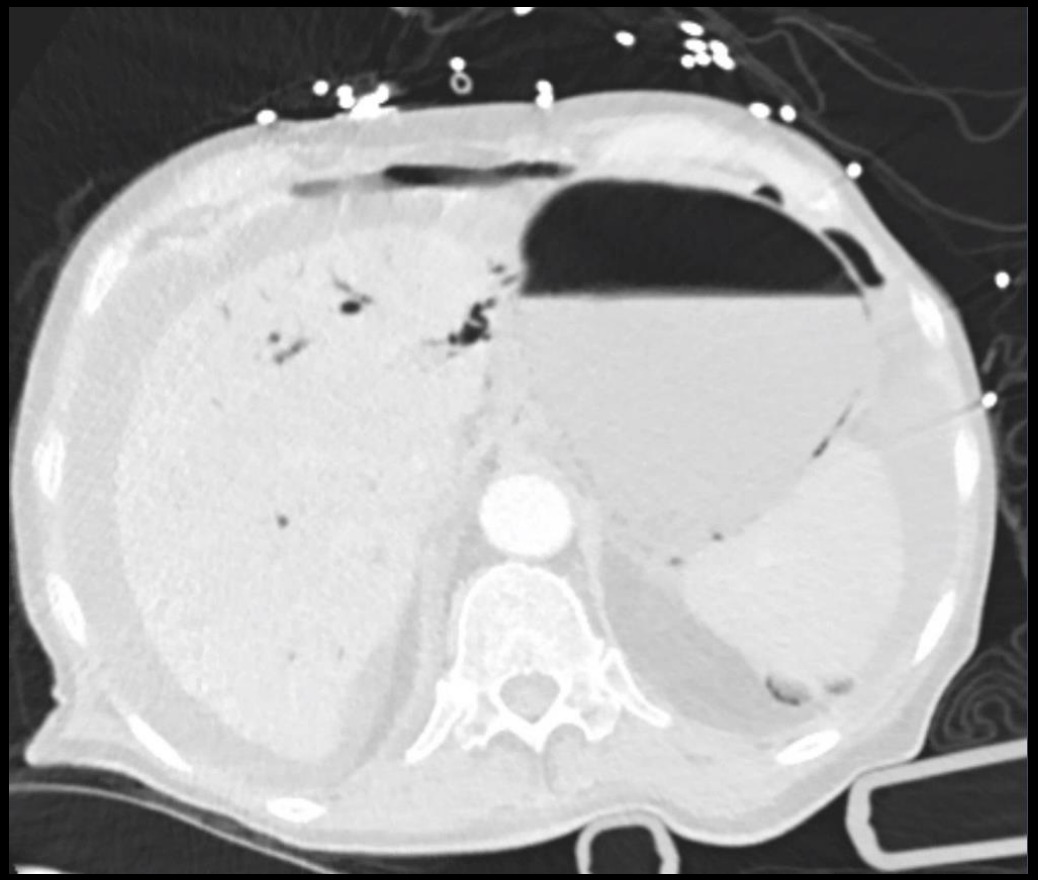
Select the applicable ACR Appropriateness Criteria

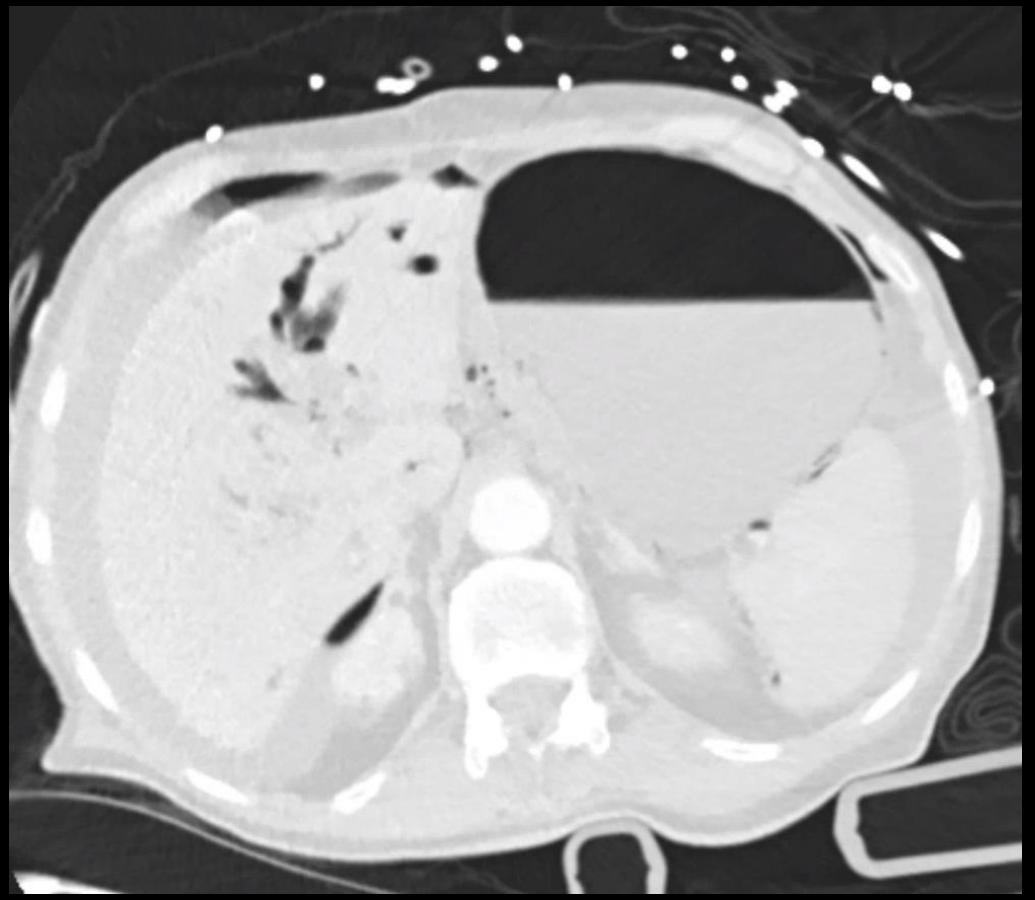
Variant 1: **Suspected acute mesenteric ischemia. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CTA abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢☢
CT abdomen and pelvis with IV contrast	May Be Appropriate	☢☢☢
Arteriography abdomen	May Be Appropriate (Disagreement)	☢☢☢
MRA abdomen and pelvis without and with IV contrast	May Be Appropriate (Disagreement)	O
Radiography abdomen	May Be Appropriate	☢☢
US duplex Doppler abdomen	May Be Appropriate	O
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	☢☢☢☢
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢
MRA abdomen and pelvis without IV contrast	Usually Not Appropriate	O

This imaging modality was one of many ordered by the trauma team

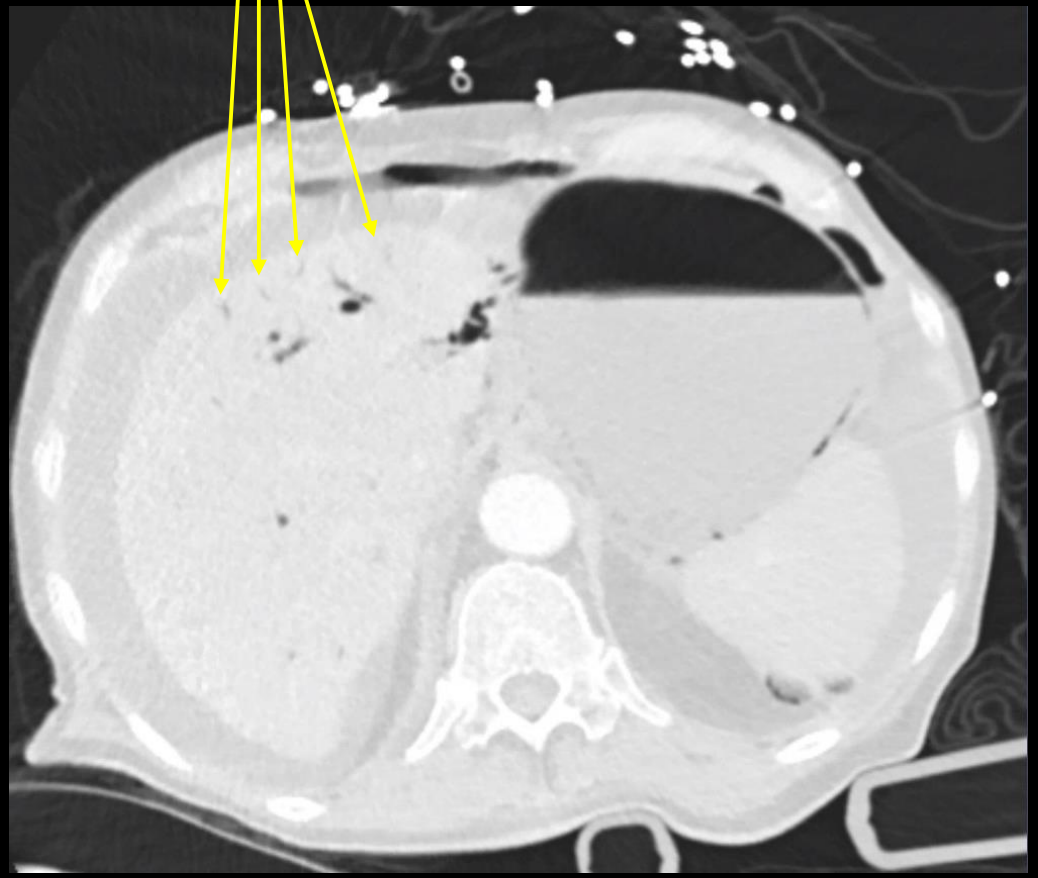
Findings (unlabeled)





Findings (labeled)

Fine lucencies in the anti-dependent periphery of the liver



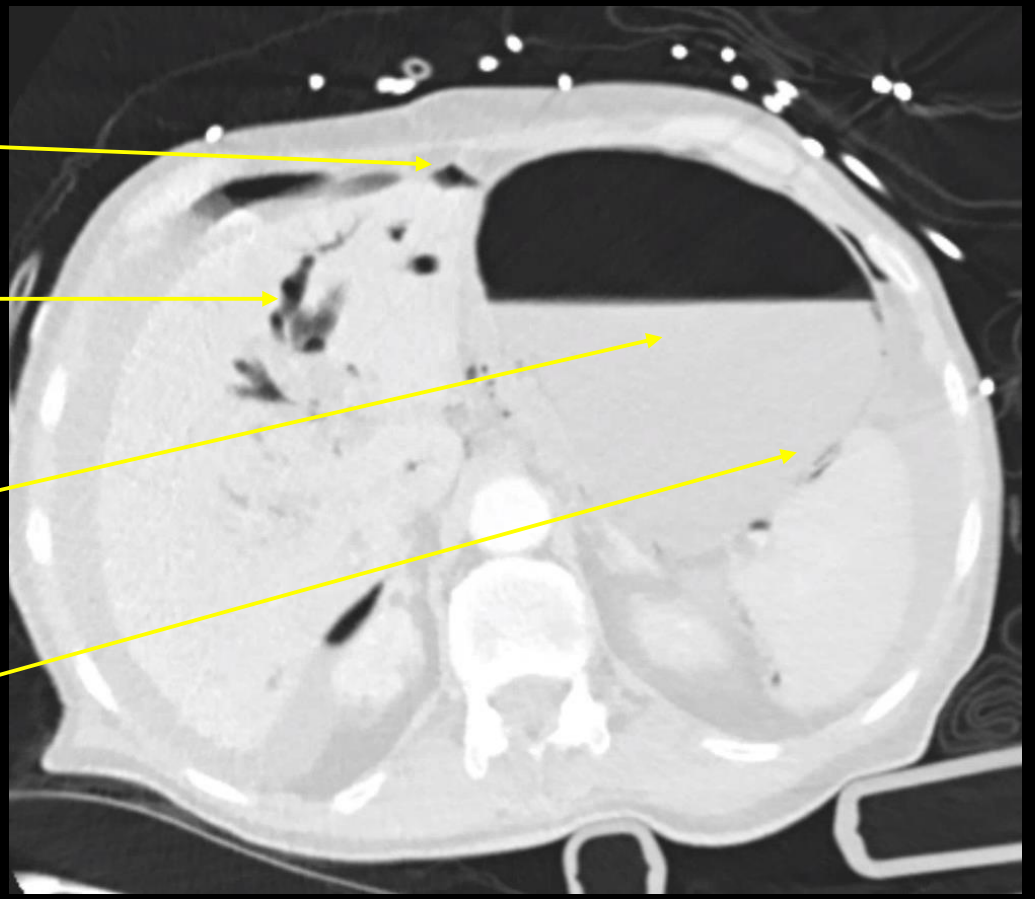
Axial image at the level of the liver, Lung window

Air in the peritoneum

Central branching lucencies

Distended stomach with air-fluid level

Lucencies along the wall of the stomach, consistent with pneumatosis



Final Dx:

Pneumobilia and Portal Venous Gas

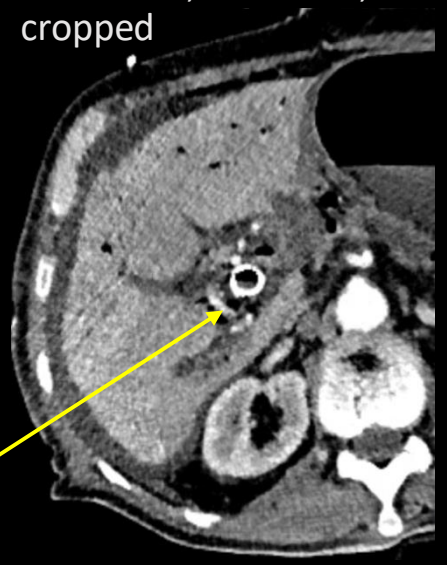
Case Discussion

- Pneumobilia and portal venous gas can be distinguished by their appearance on CT
  - Pneumobilia presents as a gas pattern that is:
    - Centrally located
    - Branching
    - Anti-dependent: preference for the left lobe of the liver
  - Portal venous gas presents as a gas pattern that is:
    - Peripherally located (extends to within 2cm of the liver capsule)
    - Made up of smaller air bubbles
    - Generally more extensive than pneumobilia

Case Discussion

- Causes of Pneumobilia
  - Iatrogenic (most common)
    - Biliary-enteric surgical anastomosis
    - Recent ERCP
  - Other
    - Spontaneous biliary-enteric fistula (most common non-iatrogenic cause)
    - Incompetent sphincter of Oddi
  - Rare but "can't miss" causes
    - Emphysematous cholecystitis
    - Acute cholangitis
    - Liver abscess
- Our patient had a biliary stent
  - a permanent biliary-enteric connection

Liver window, axial slice, cropped



Soft tissue window, coronal reformat, closely cropped

Mesenteric gas

Portion of bowel with differential enhancement

Pneumatosis intestinalis

- Causes of Portal Venous Gas (broad differential)
  - Alterations of the bowel wall
    - e.g. bowel ischemia, IBD
  - Distention of the bowel lumen
    - e.g. bowel obstruction, endoscopy, ileus
  - Intra-abdominal sepsis
    - e.g. diverticulitis, cholecystitis, appendicitis
  - Idiopathic
    - e.g. Pneumatosis intestinalis, corticosteroid use
- Our patient had pneumatosis intestinalis and a portion of non-enhancing jejunum, thought to be ischemic bowel

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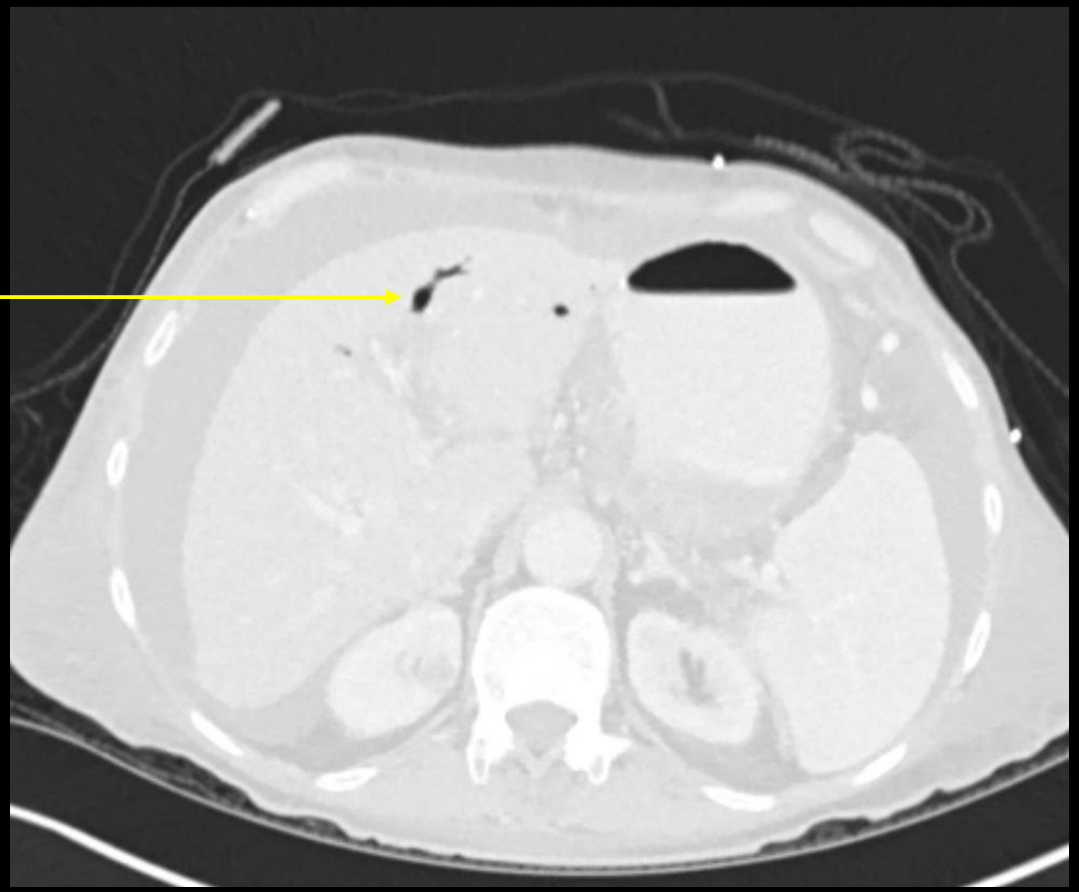
Case continued

- Given the patient's
  - Elevated lactate
  - Imaging evidence of ischemic bowel
    - non-enhancing jejunum
    - portal venous gas
    - pneumatosis intestinalis
- An exploratory laparotomy was performed.

- The patient's bowel was determined to be healthy by intraoperative visual inspection.

Case resolution

- Five days later, the patient developed signs of sepsis, and another CT abdomen/pelvis was obtained.
- Appreciate
  - Interval resolution of peripheral liver lucencies
  - Interval resolution of pneumatosis intestinalis
  - Persistent central branching lucencies in the liver
- Conclusion
  - Interval resolution of portal venous gas
  - Persistent pneumobilia due to the biliary stent
- Takeaways
  - Identify the difference between pneumobilia and portal venous gas on CT
  - Portal venous gas and pneumobilia are important imaging features but can be non-specific and must be interpreted in the context of clinical presentation.
- For another interesting and similar case, consider taking a look at this case study by Hussein et al.: https://doi.org/10.1093/jscr/rjv136



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