AMSER Case of the Month
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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

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

- 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**

- Mesenteric gas
- **Pneumatosis intestinalis**
- **Portion of bowel with differential enhancement**
- **Liver window, axial slice**
- **Soft tissue window, coronal reformat**
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
References: