

Complications of Bariatric Surgery

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Financial Disclosures

- I have no relevant financial disclosures.

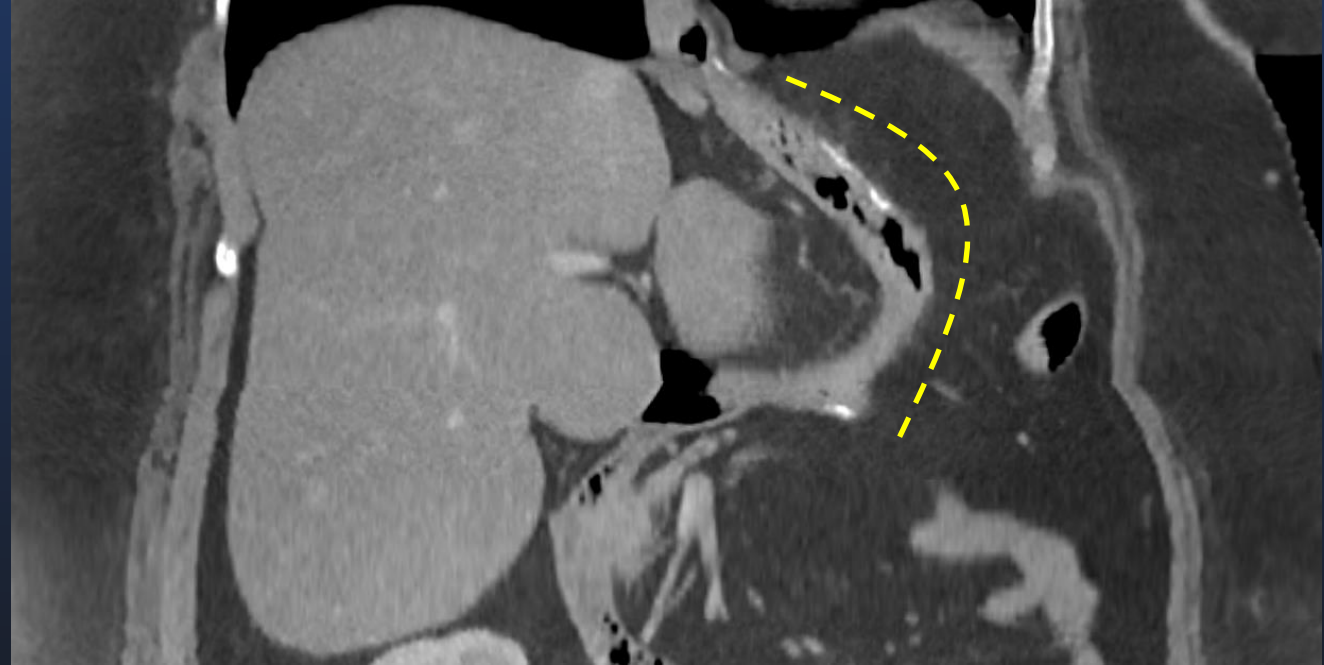
Introduction

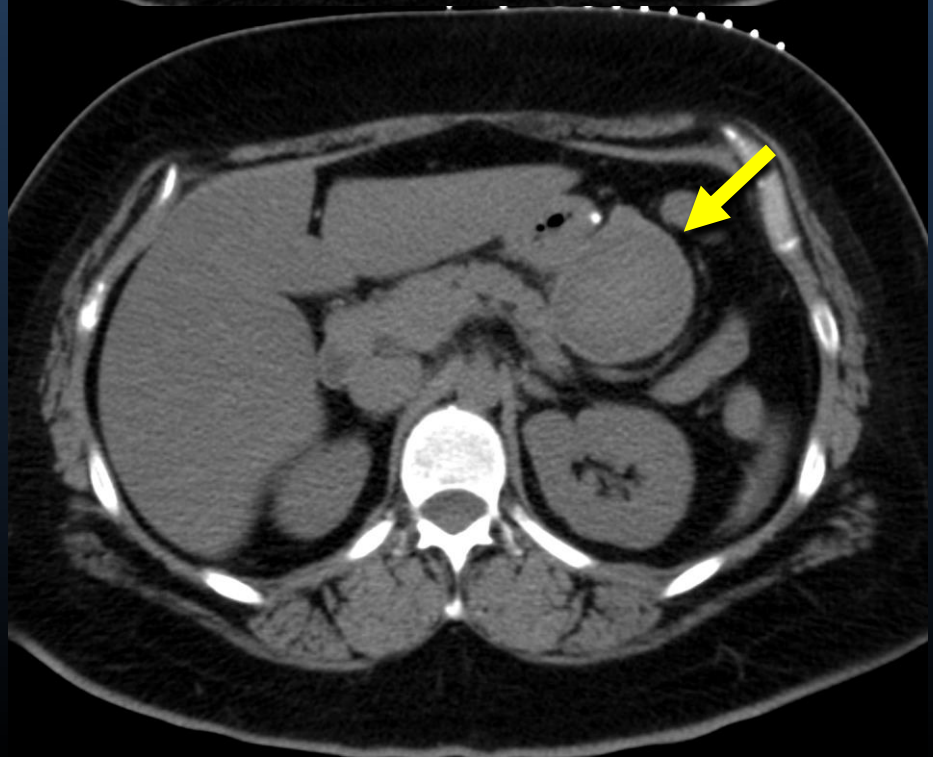
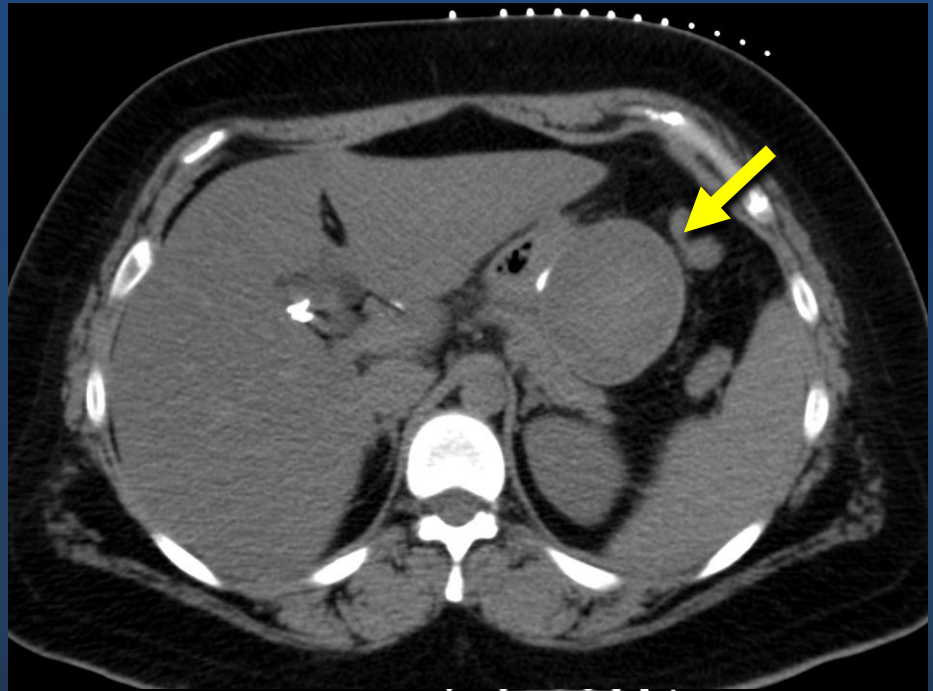
- Most common bariatric techniques in my practice:
 - Gastric sleeve
 - Roux-en-Y gastric bypass
 - Gastric band
 - Duodenal switch



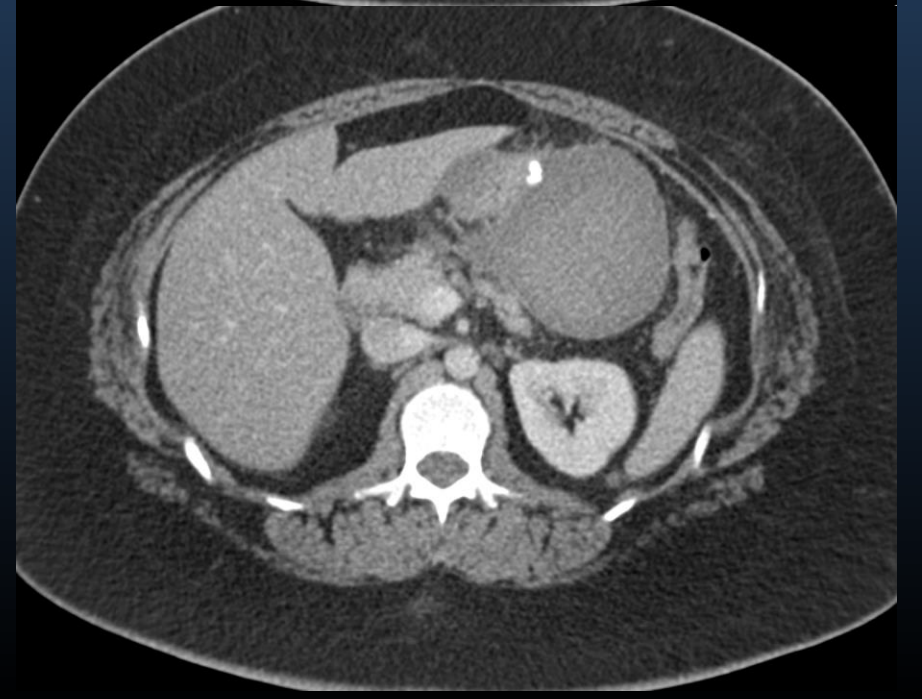
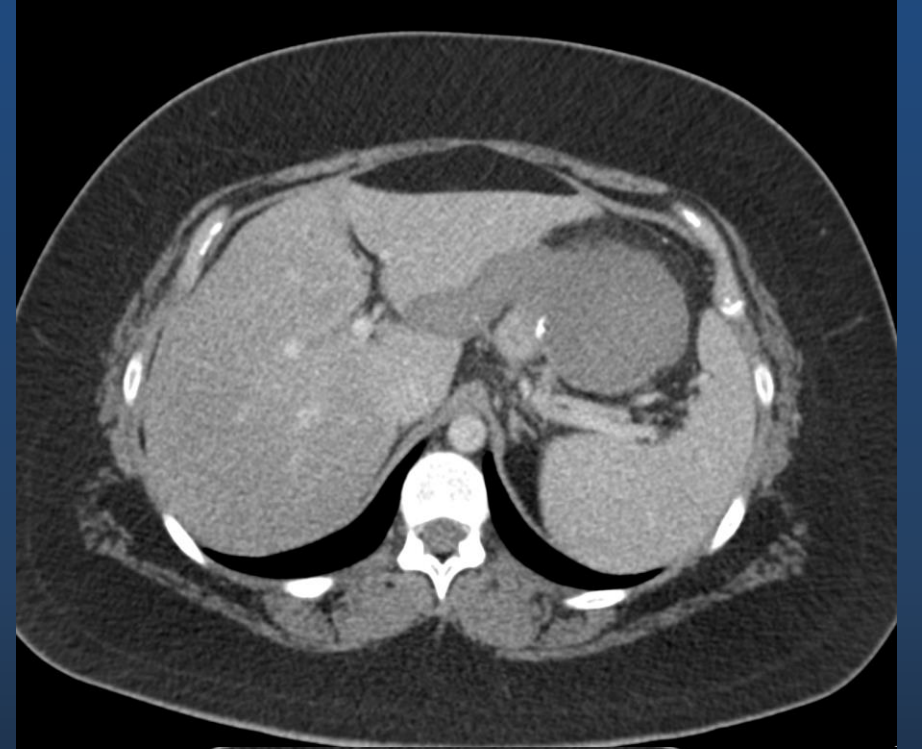
Gastric Sleeve

- Increasing use in last decade
- Restrictive – excision along greater curvature
- Main complications: leak and hemorrhage



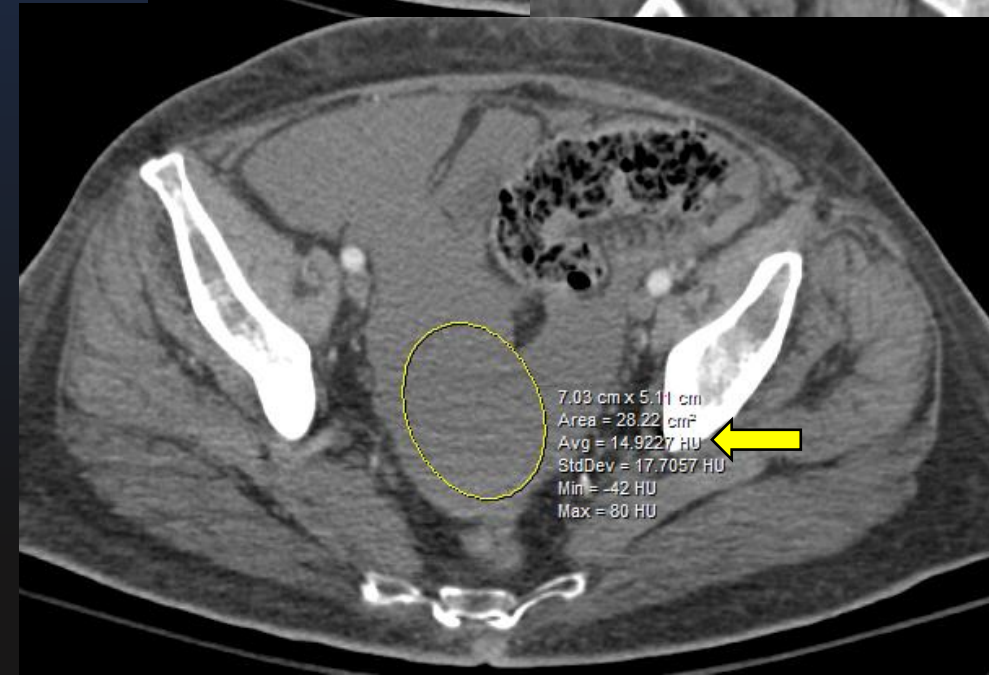
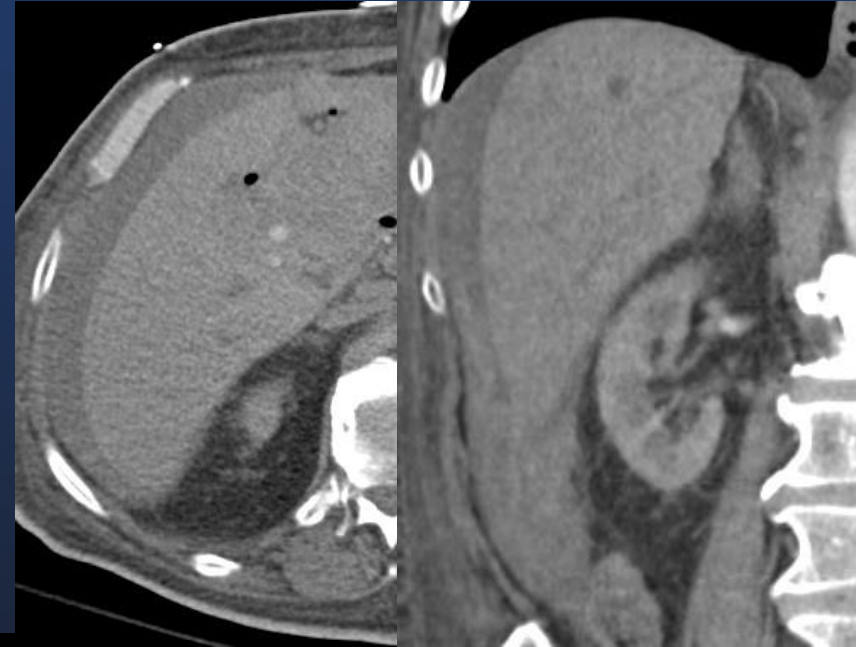


4 months
earlier...



Postoperative Hemoperitoneum

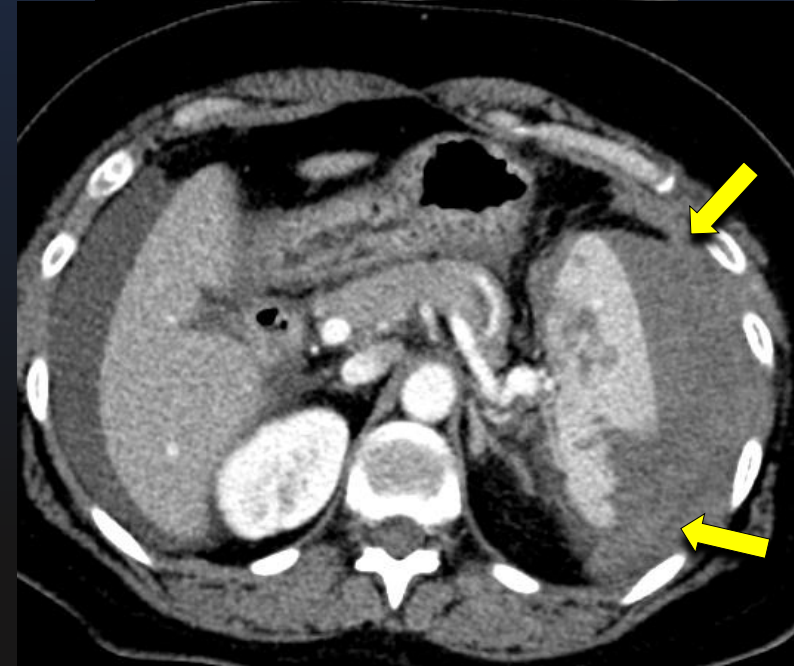
- Hemoperitoneum may occur after any abdominal surgery
- Higher incidence with anticoagulation
- HU classically 30-70 – Pitfalls:
 - Anemic blood lower in attenuation
 - Portions of blood may measure under 20 HU (up to 24% of cases*)



*Levine CD et al, AJR 1996

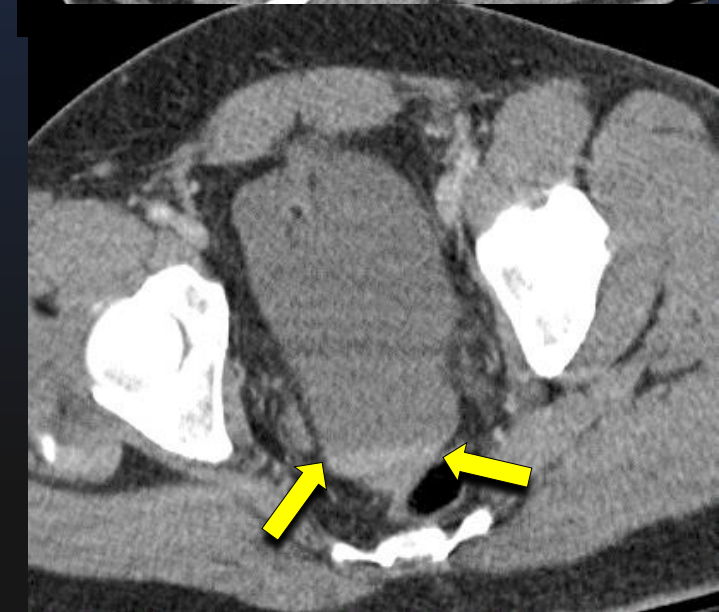
Hemoperitoneum – Sentinel Clot

- Highest attenuation blood
- Closest to source of bleeding
- May be useful in pts with multiple injuries
- Narrow windows



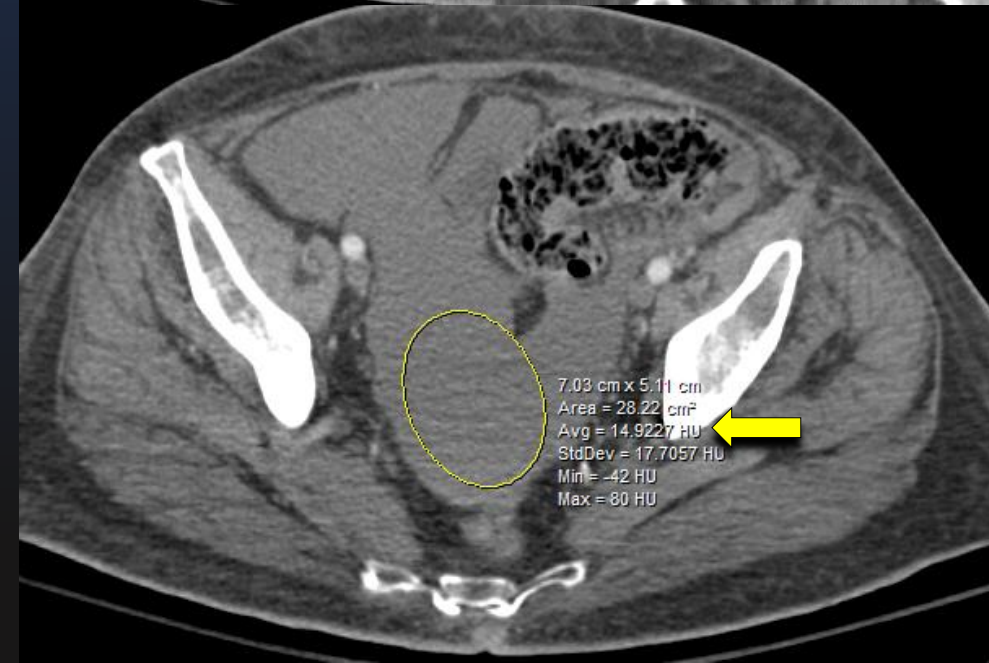
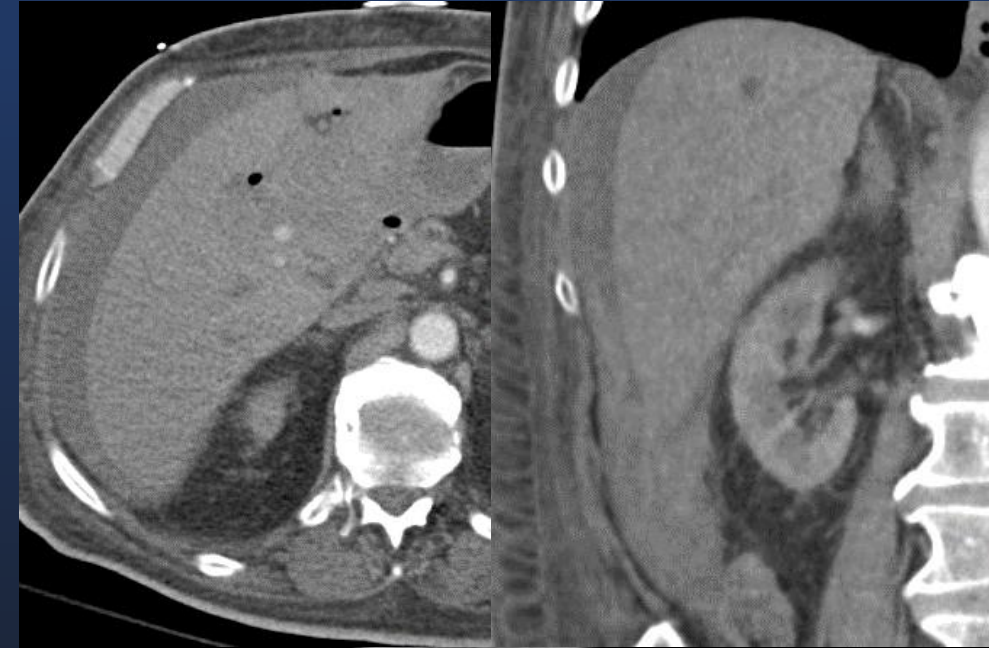
Hematocrit Effect

- Sedimented RBCs dependently
- Higher density posteriorly
- Usually seen with fresh blood
- Coagulopathic bleeding?



Hemoperitoneum – CT Pitfalls

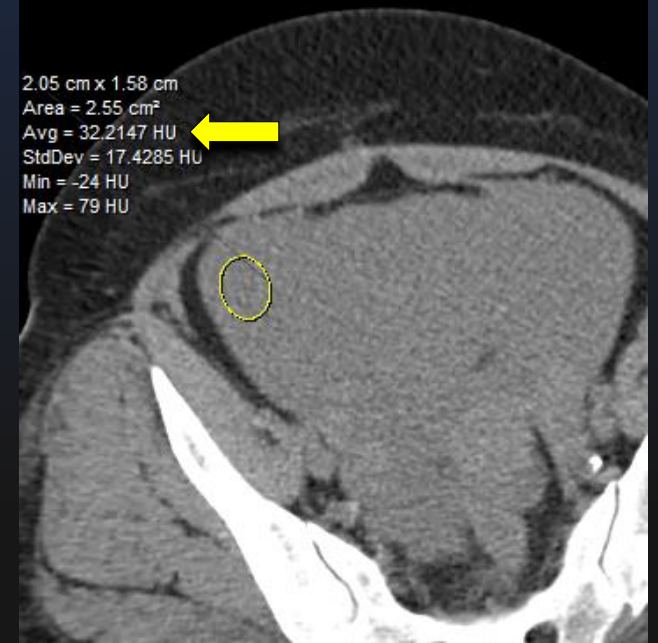
- Anemic blood lower in attenuation
- **Look carefully at all fluid**
 - Dependently
 - Around solid organs
- Portions of ascites may measure under 20 HU (up to 24% of cases*)

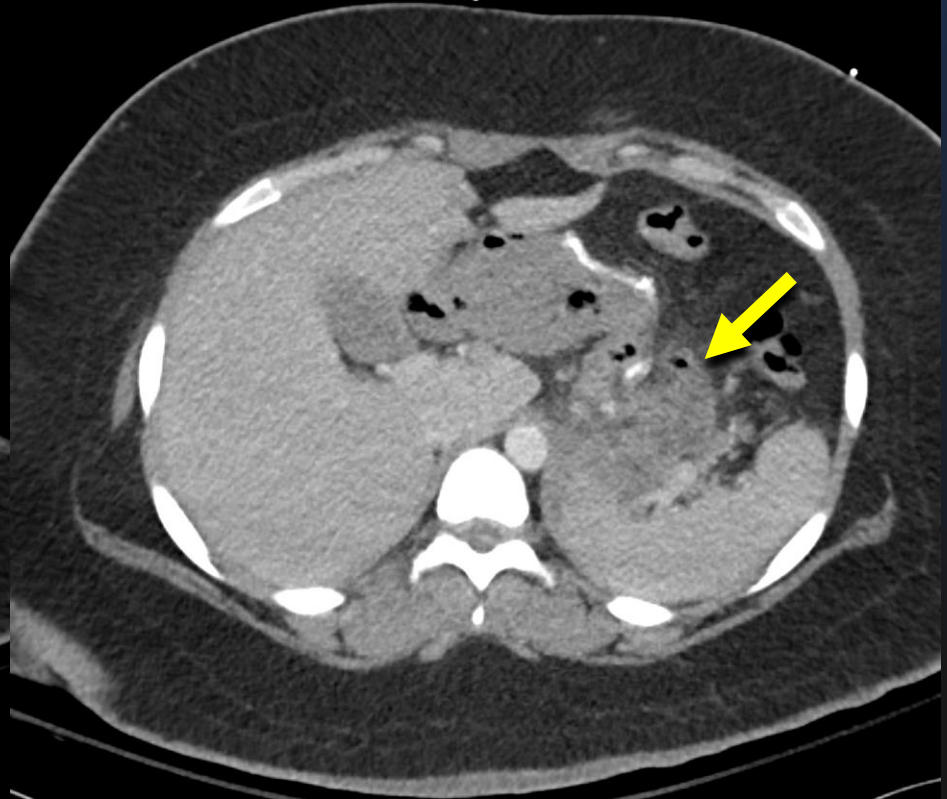
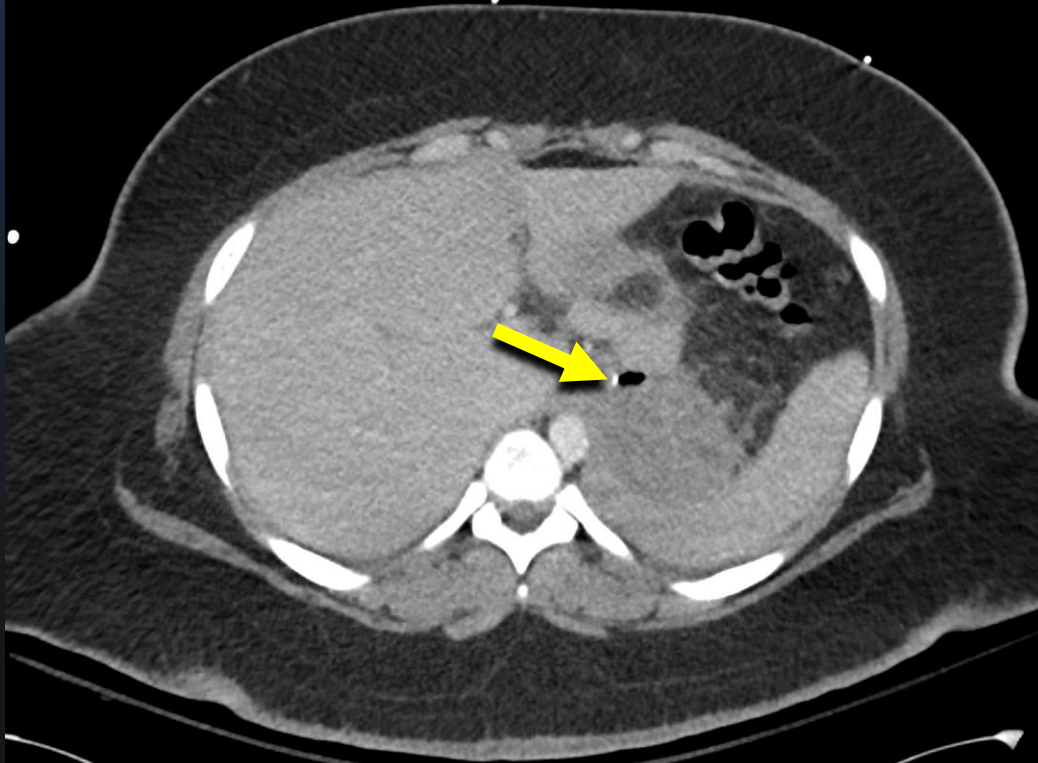
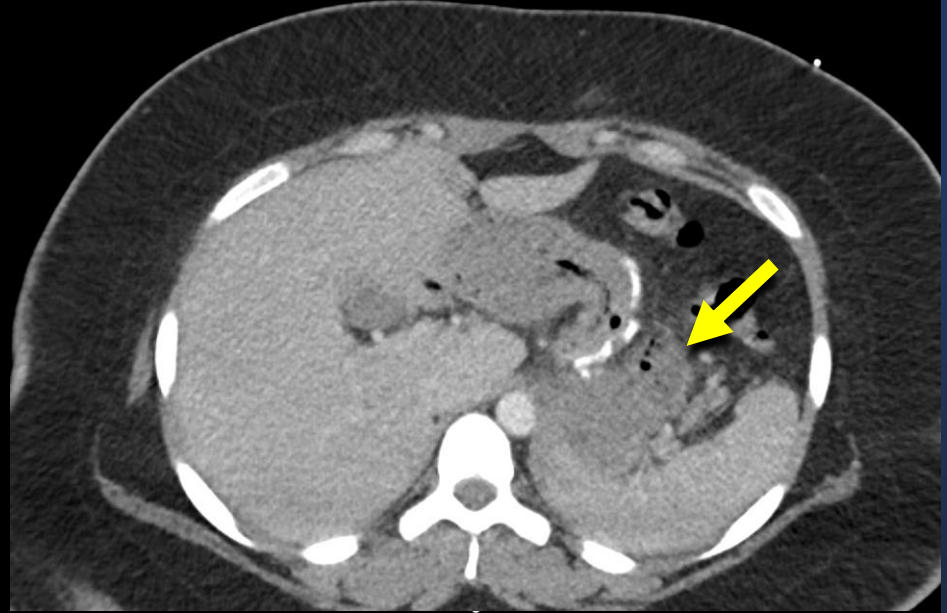
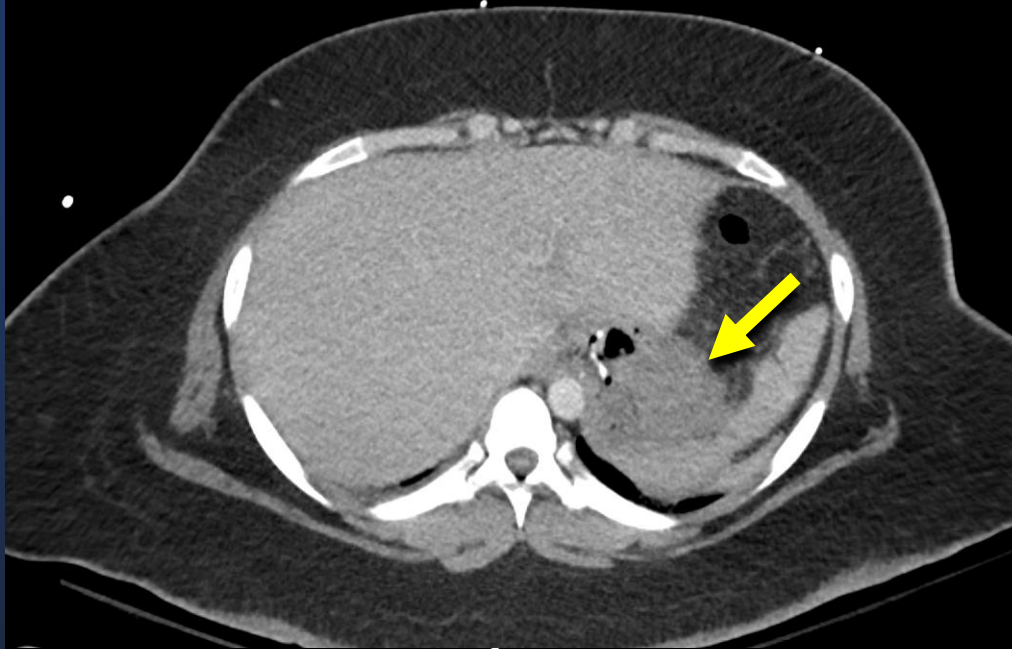


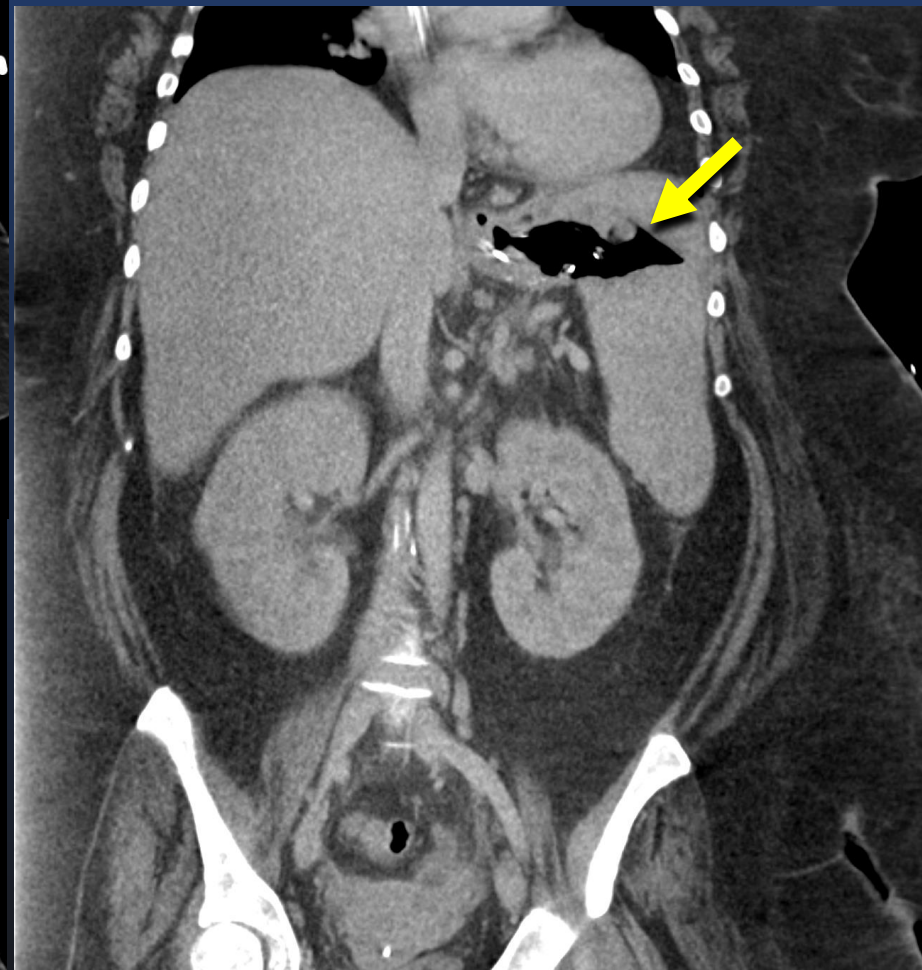
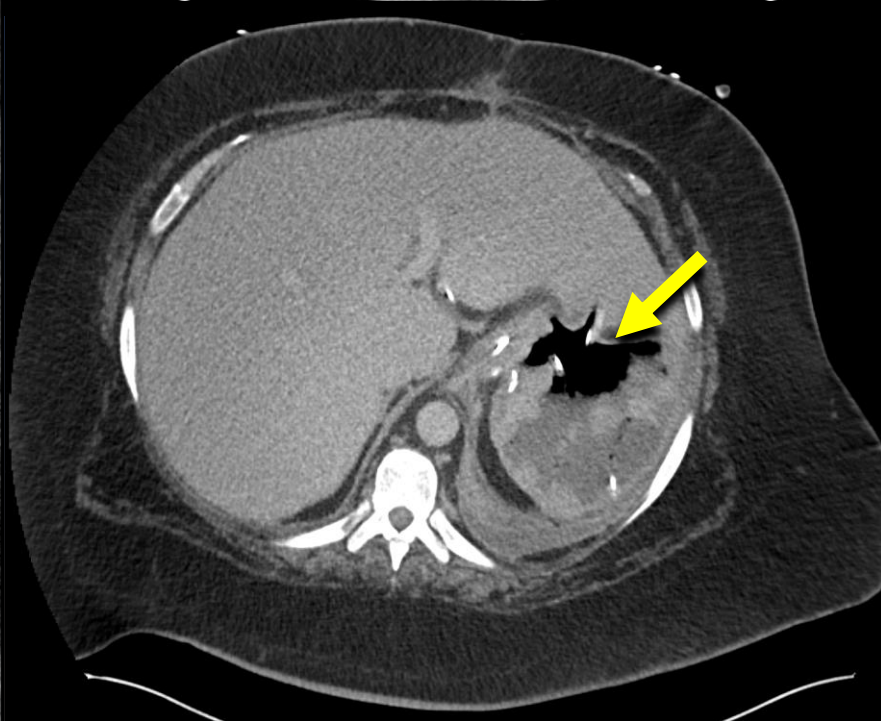
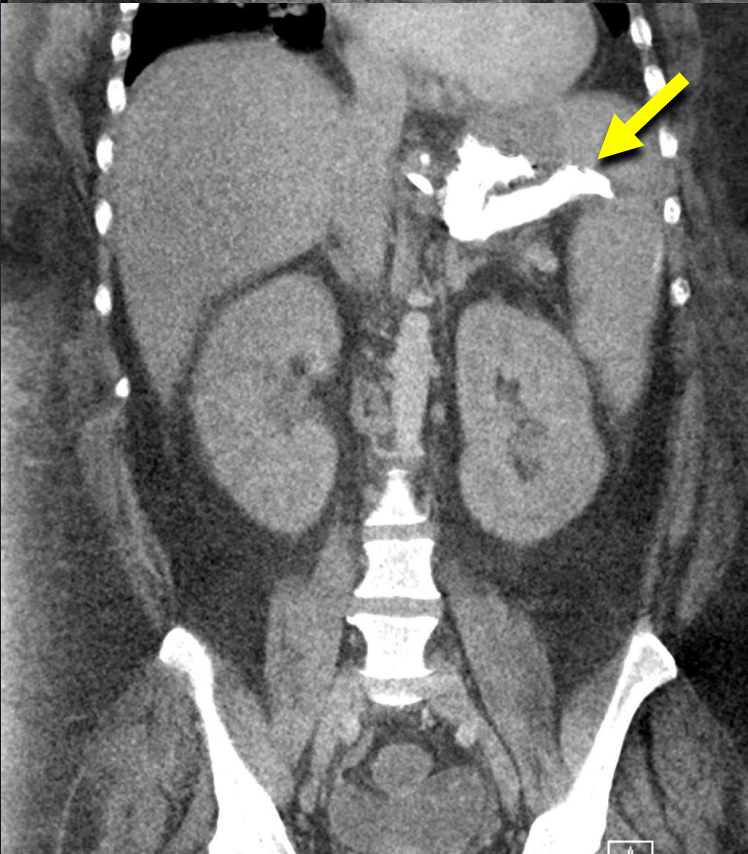
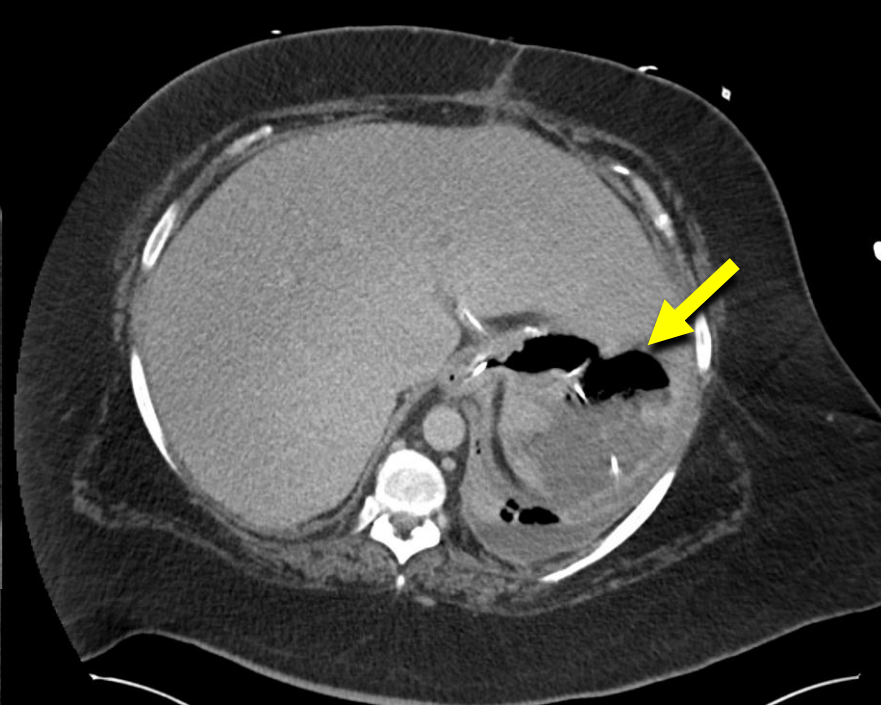
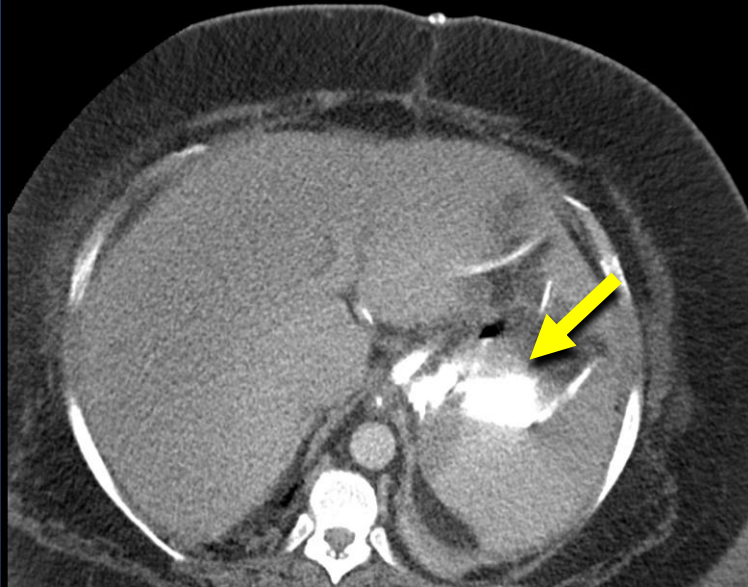
*Levine CD et al, AJR 1996

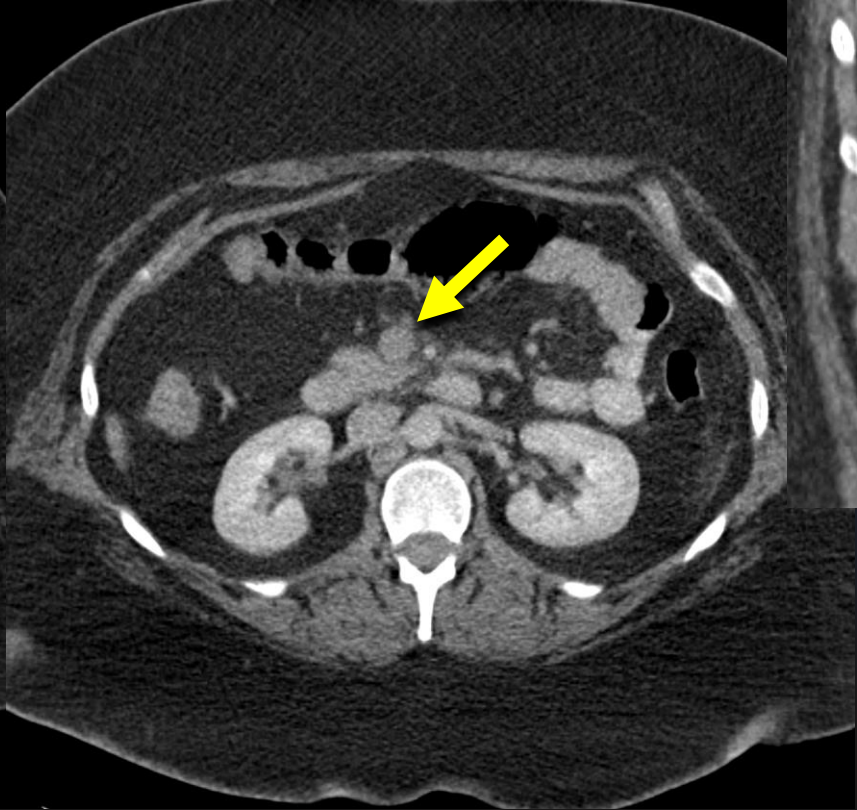
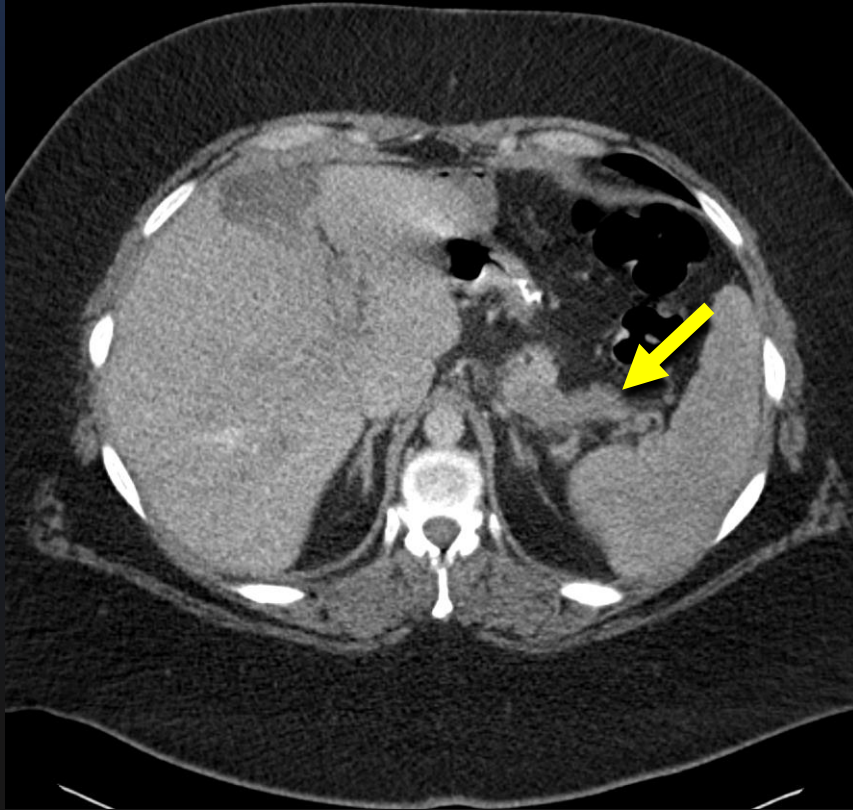
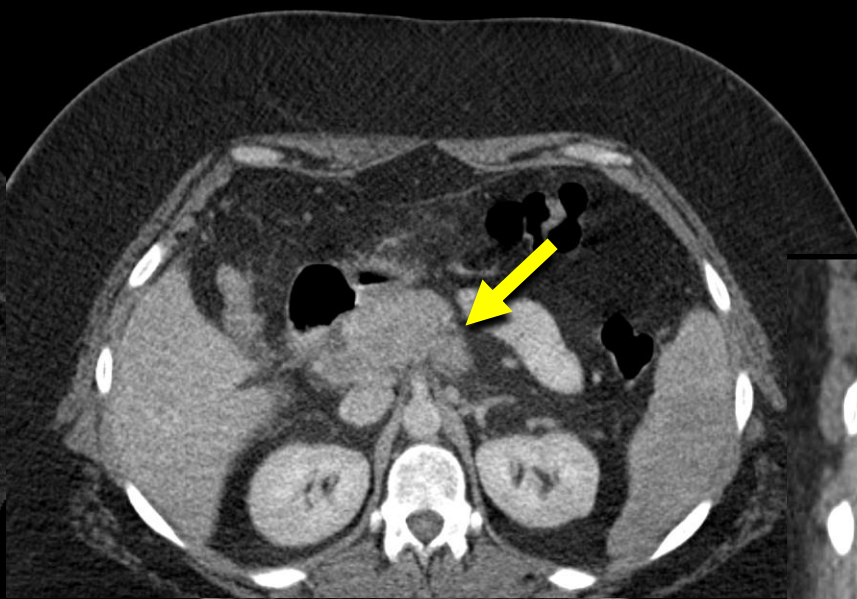
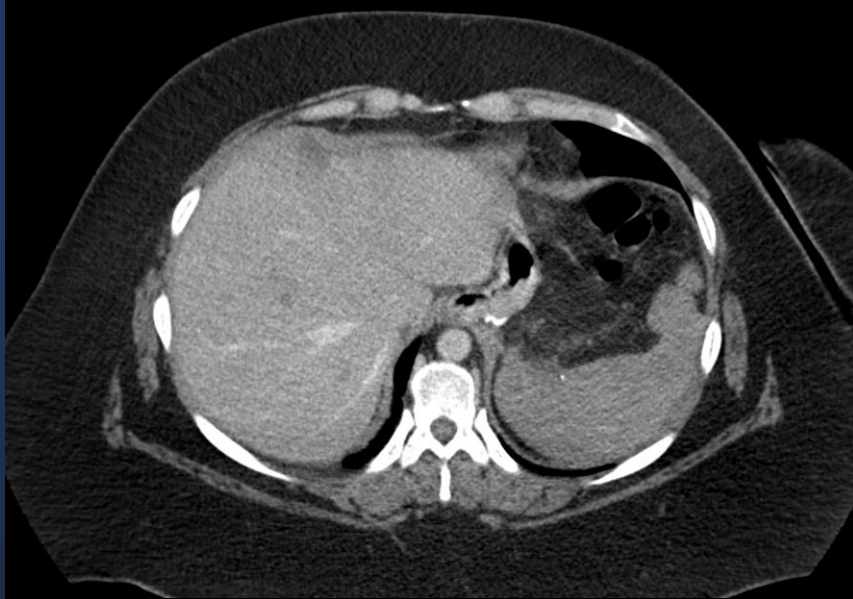
Hemoperitoneum – CT Pitfalls

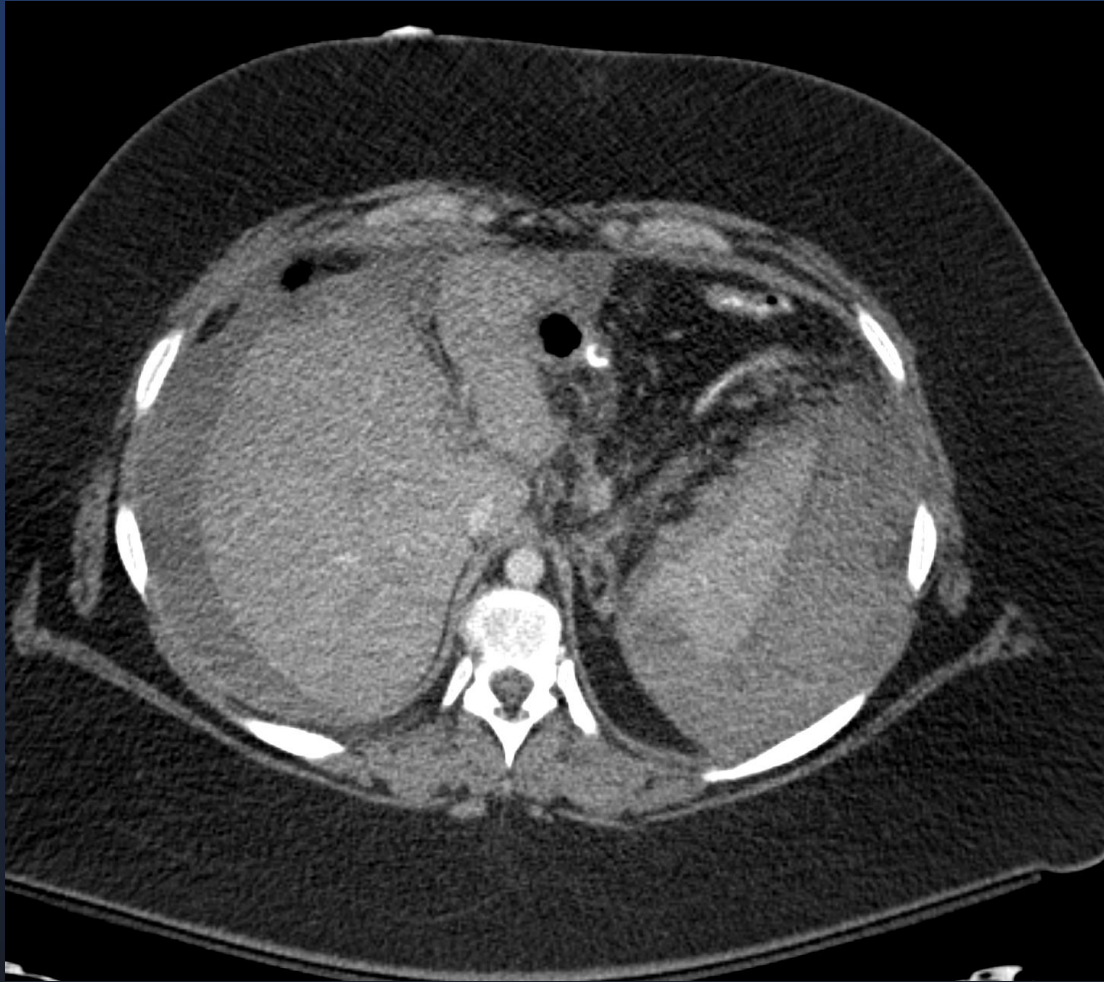
- Enhancement of intraperitoneal fluid
 - Preexisting ascites
 - Repeat scan within ~24 hours after 1st dose
 - More common in renal failure
- Homogeneous high attenuation on CT
 - No hematocrit layer
 - No sentinel clot



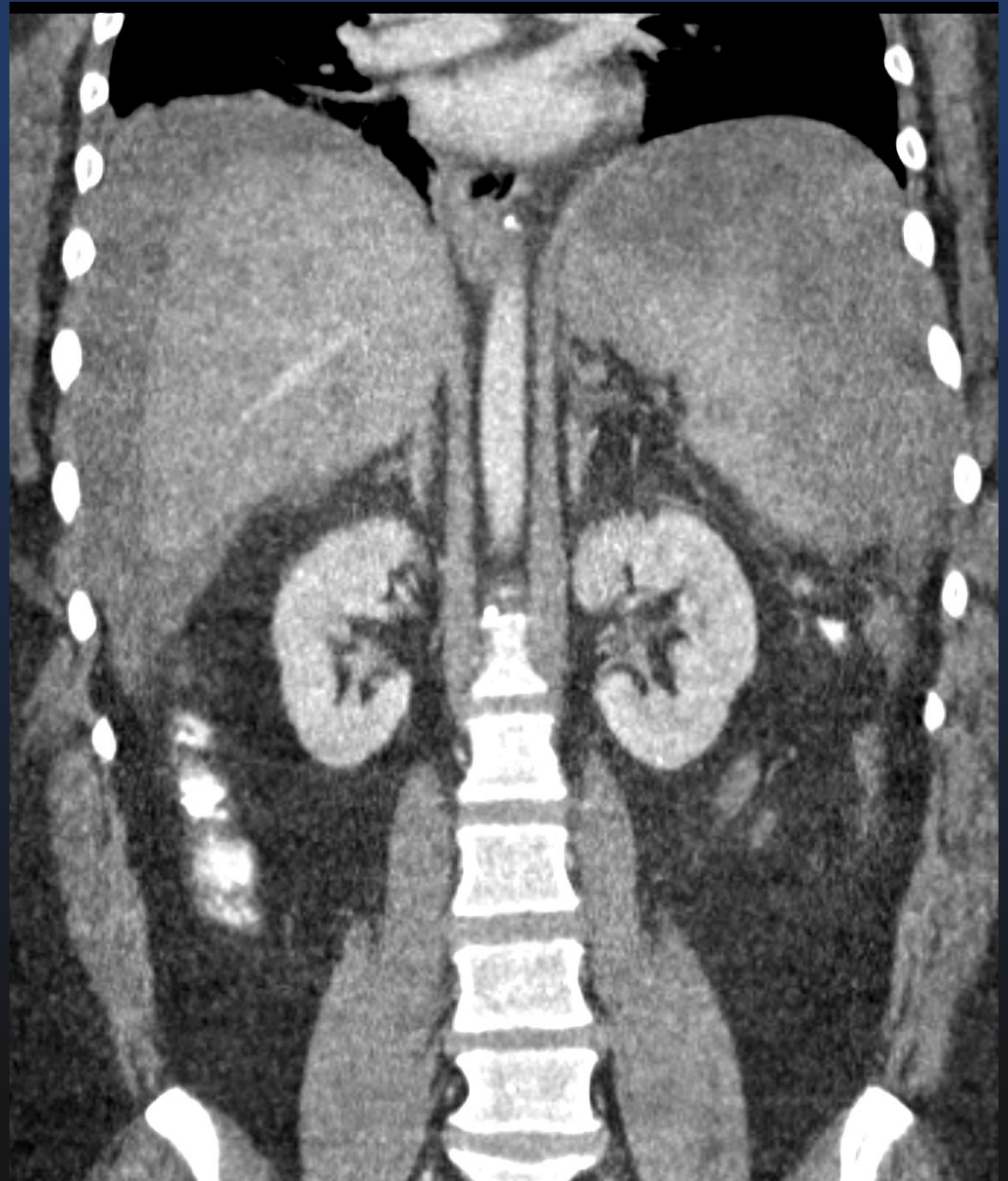


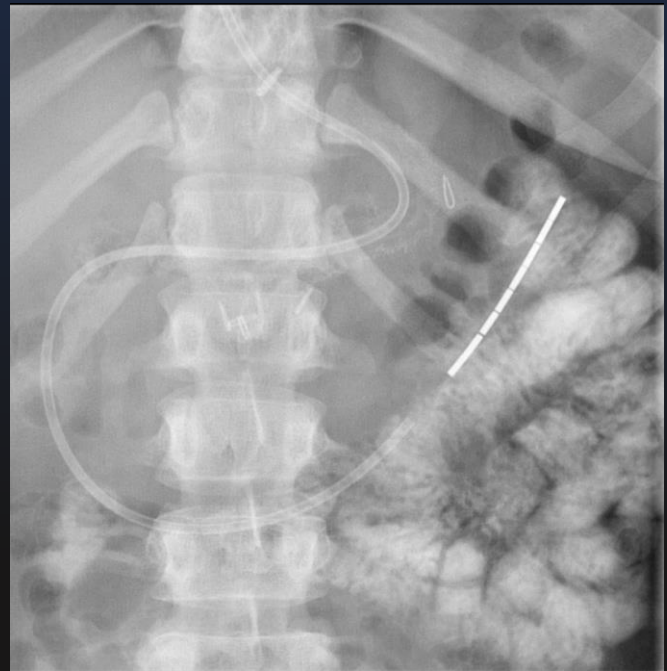


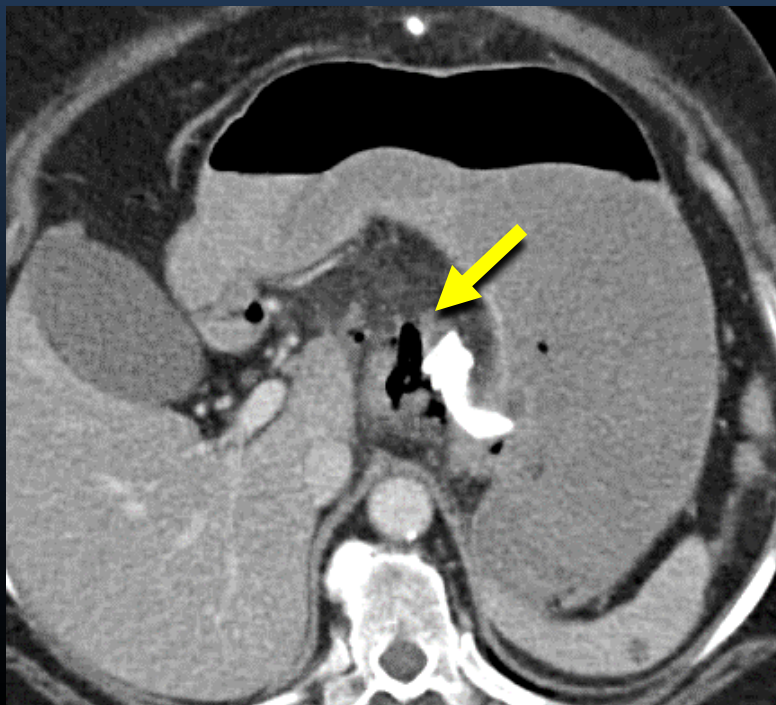
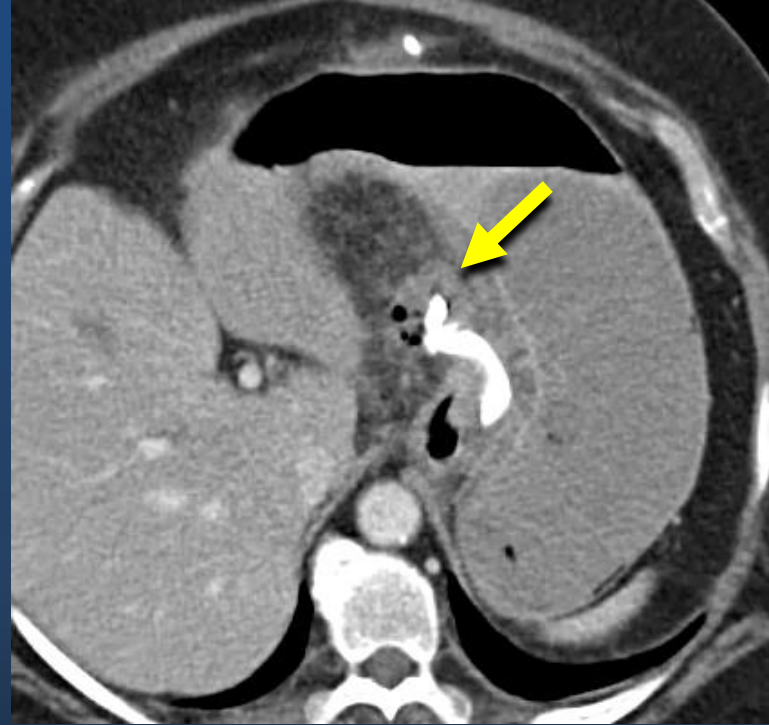
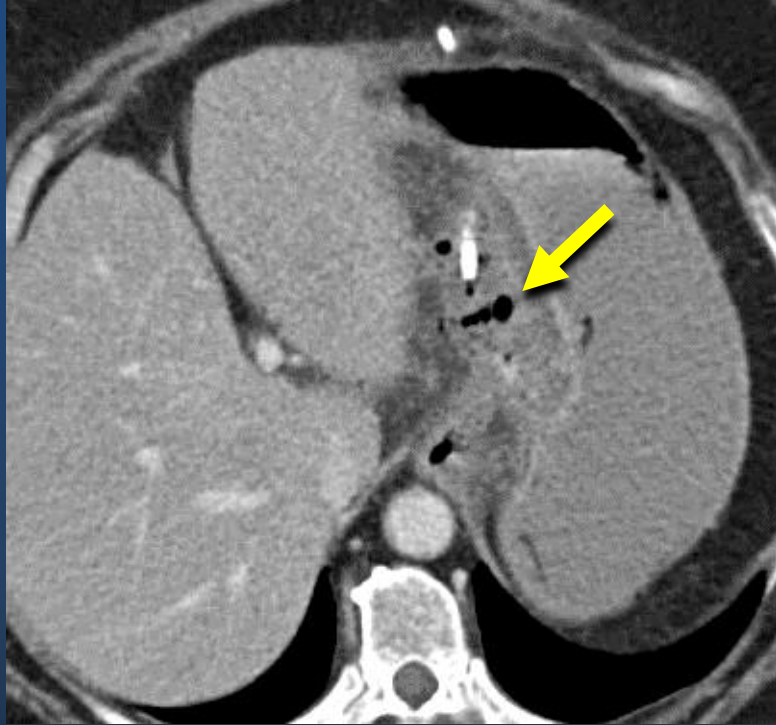




24 hours
later...

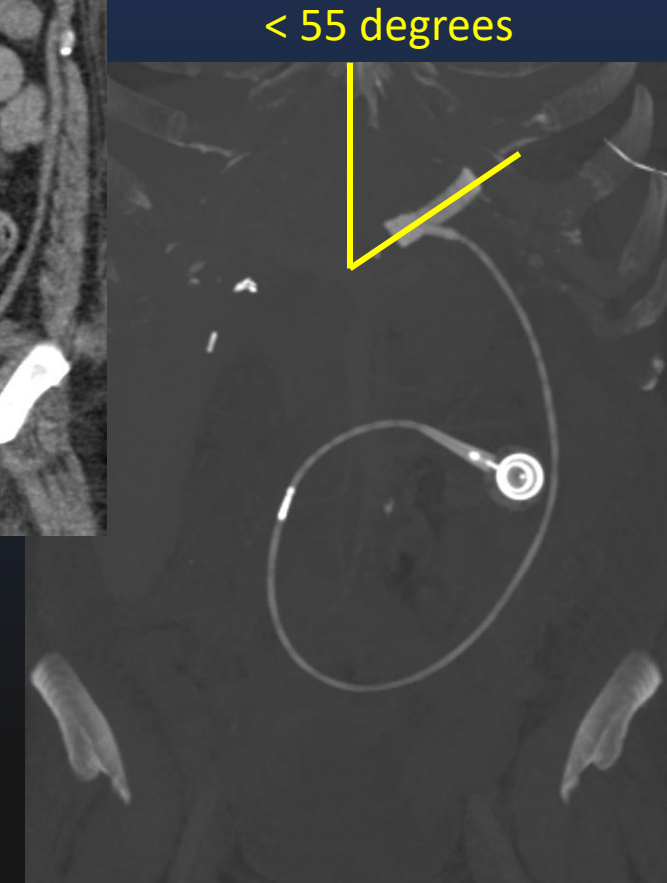




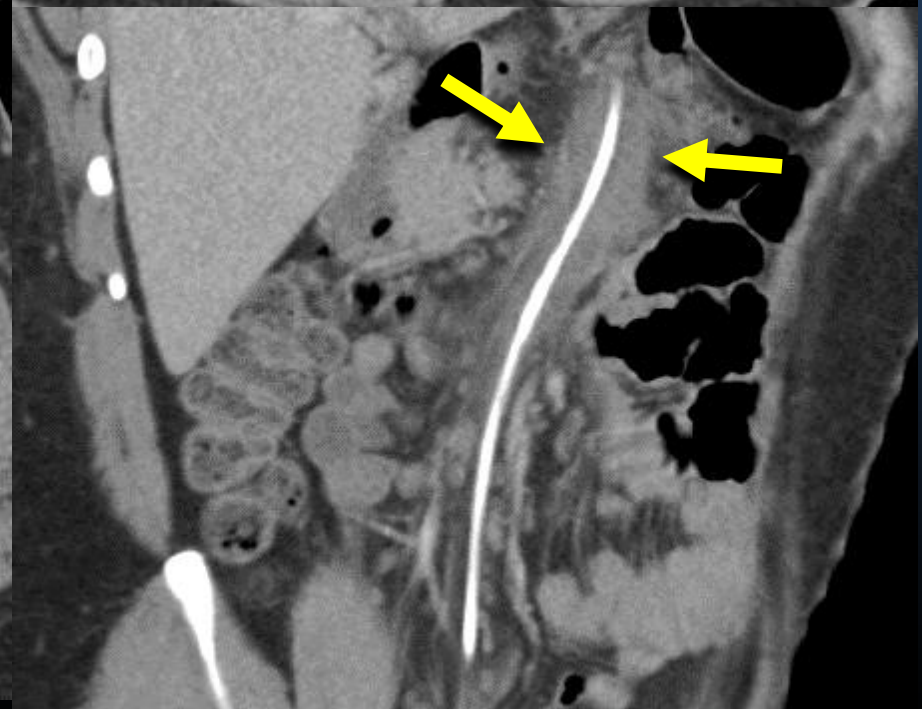
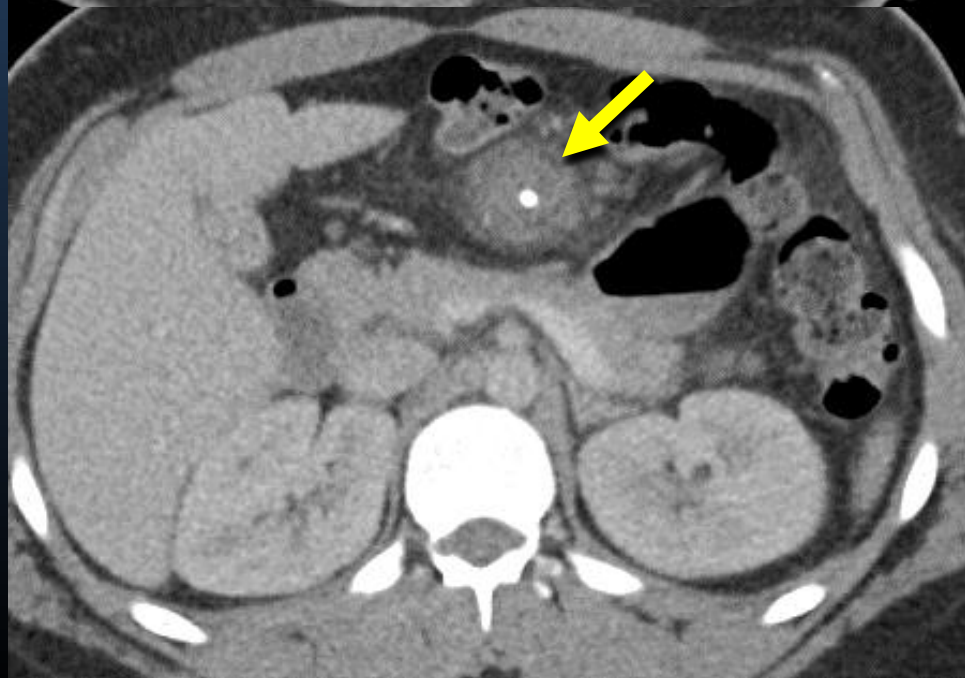
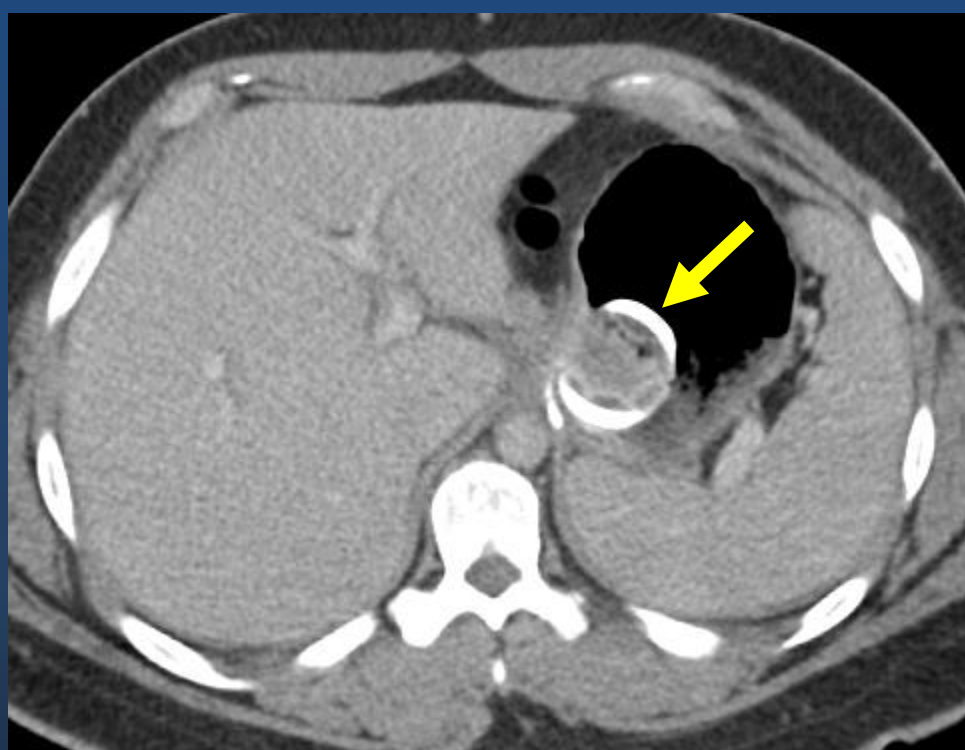


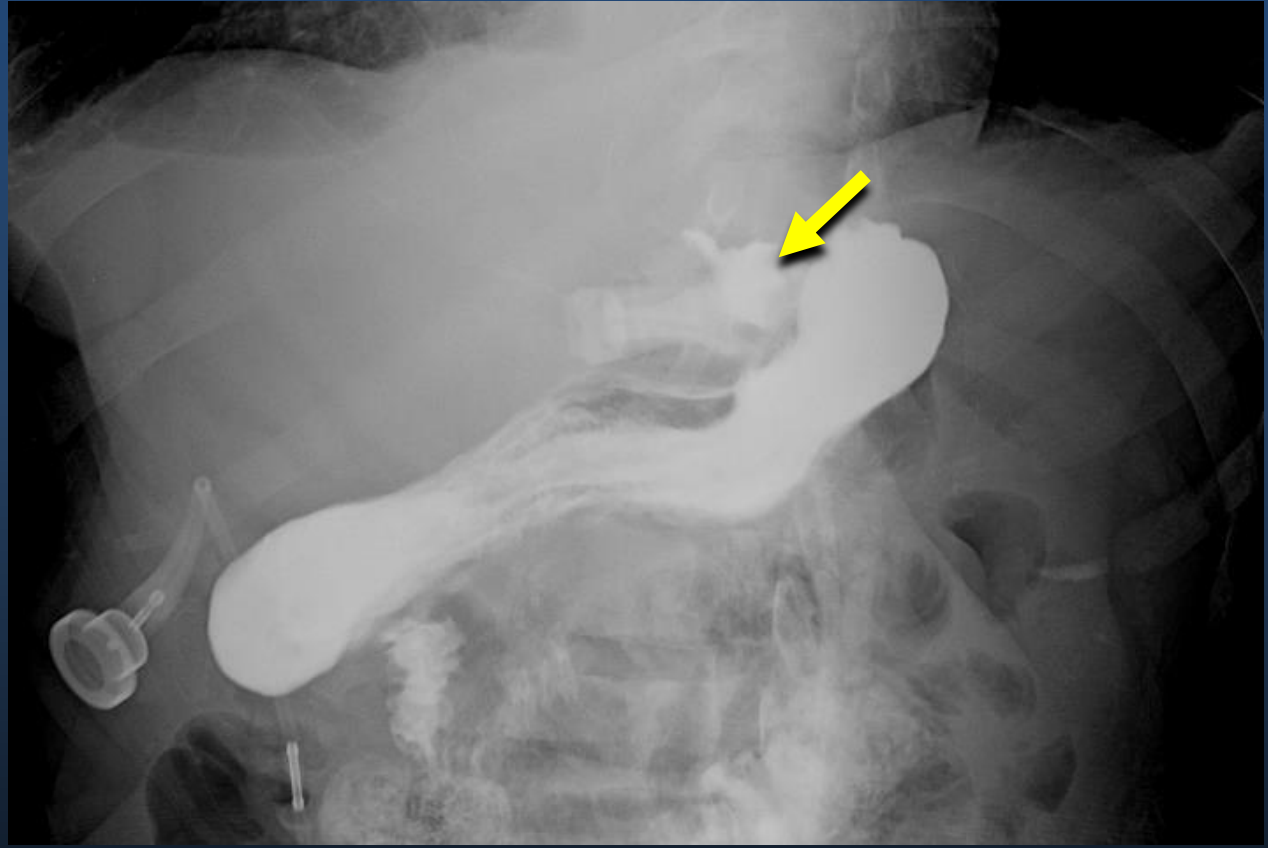
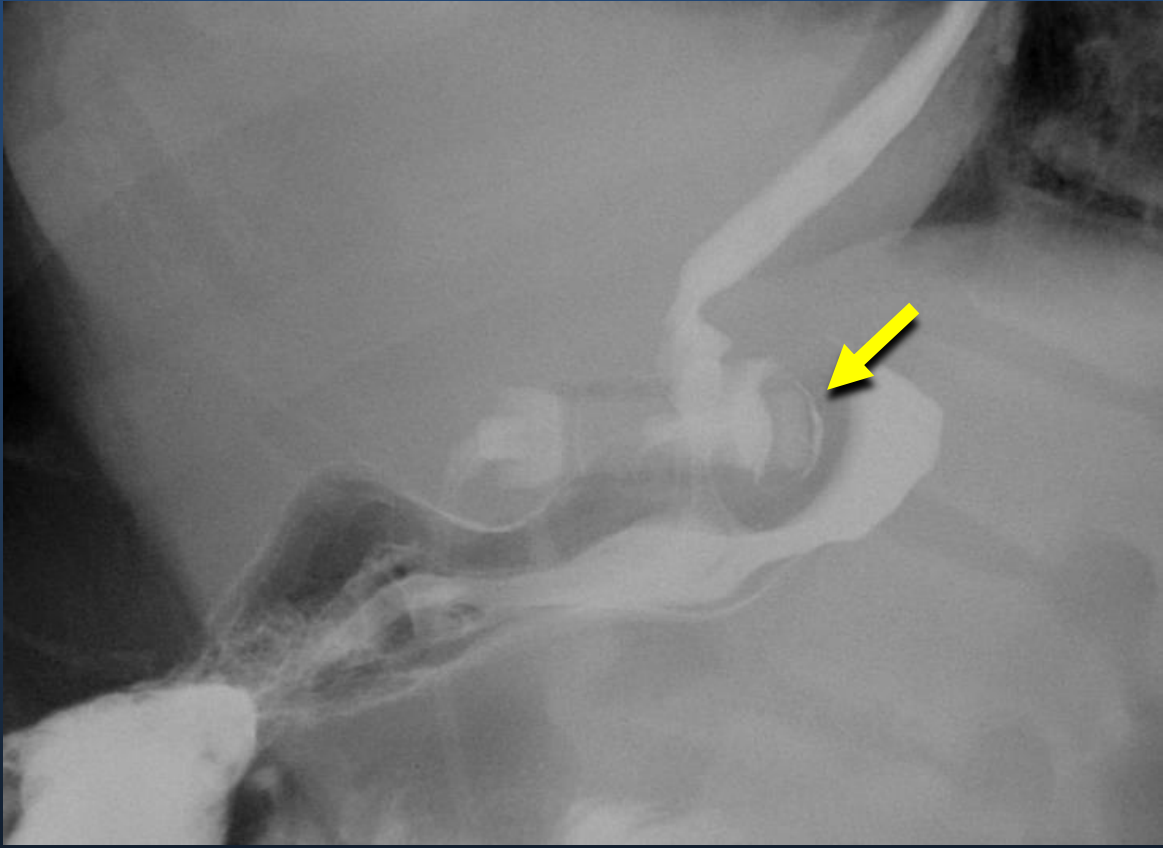
Laparoscopic Adjustable Gastric Band

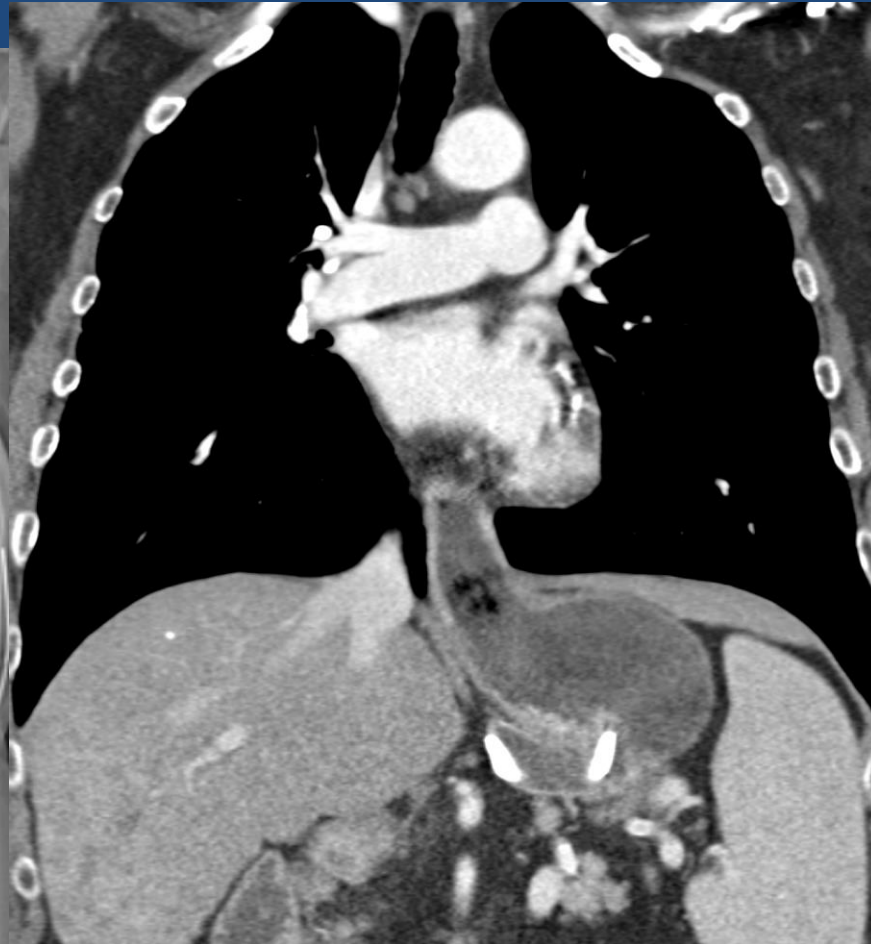
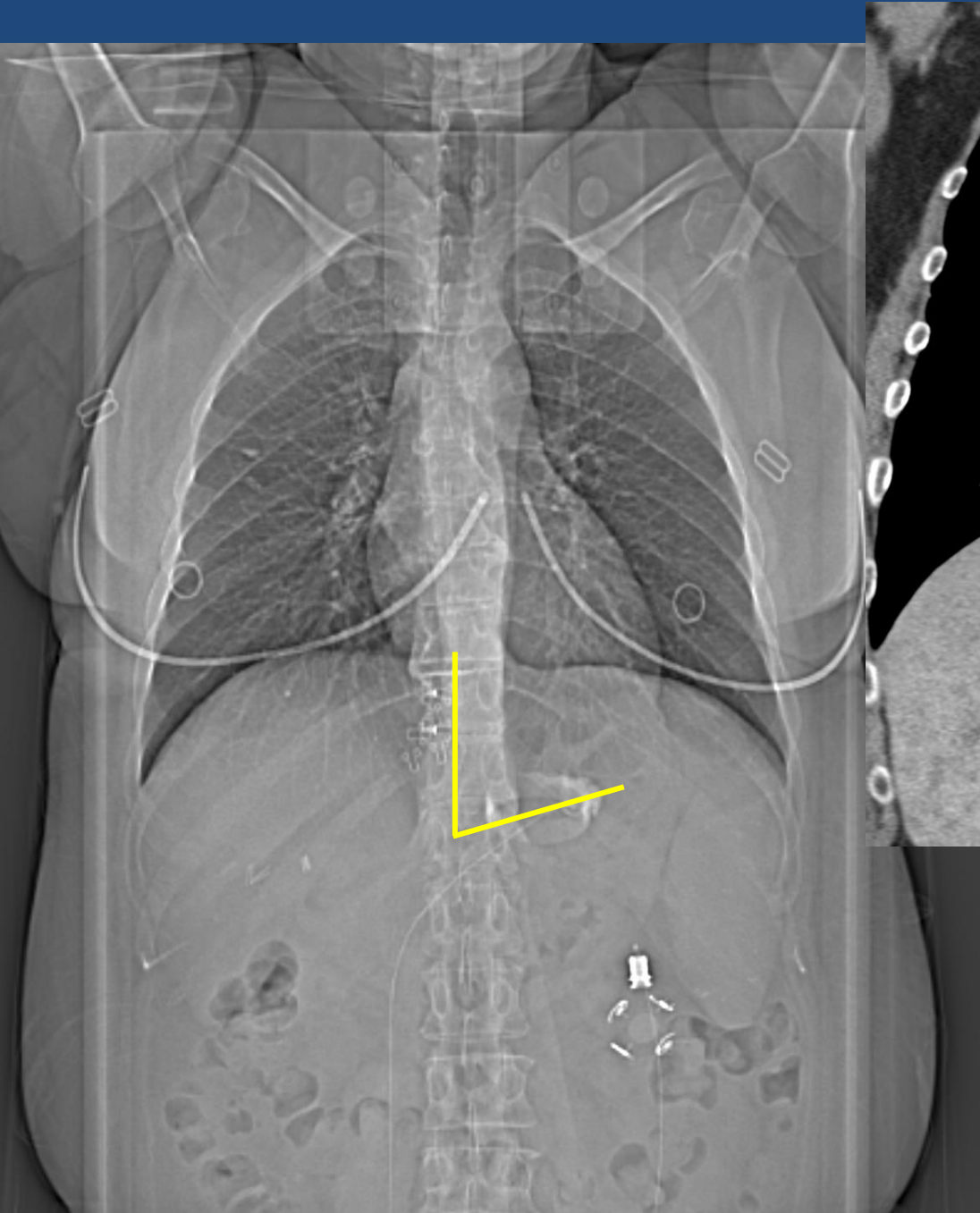
- Band external to stomach, restricting functional lumen
- Tension adjusted via port
- Main complications: band erosion and slippage
- Phi angle





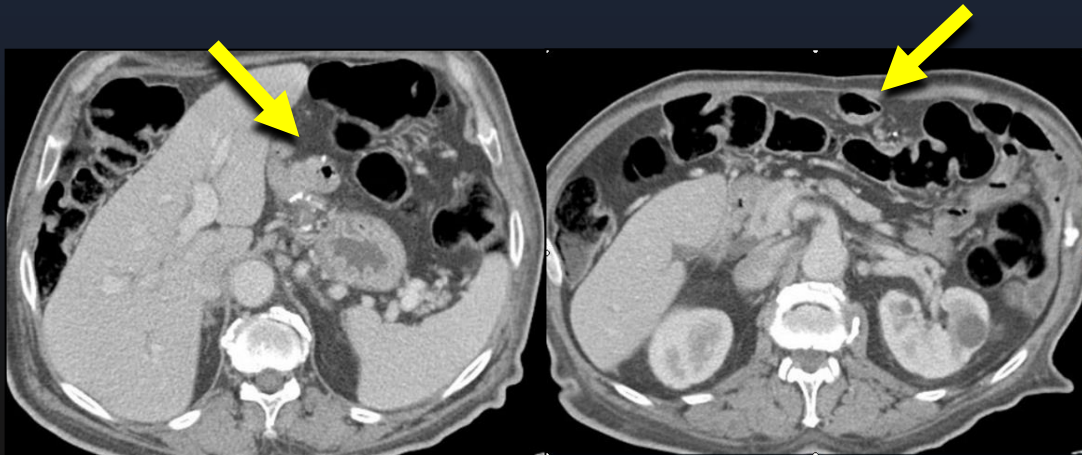




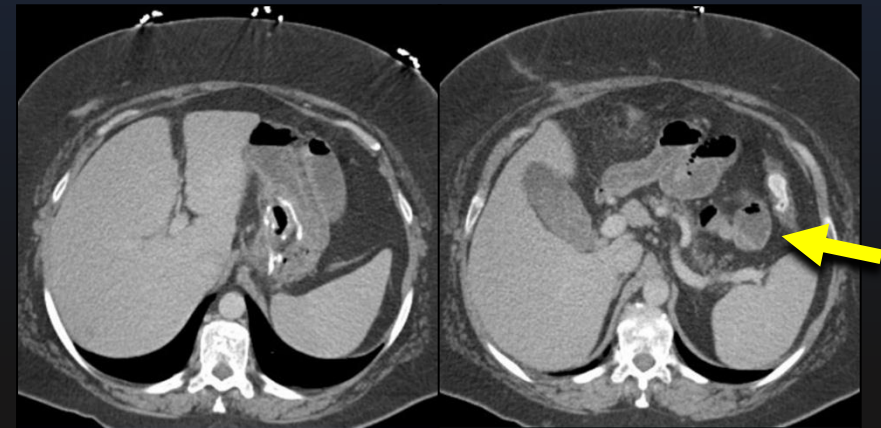


Roux-en-Y Gastric Bypass

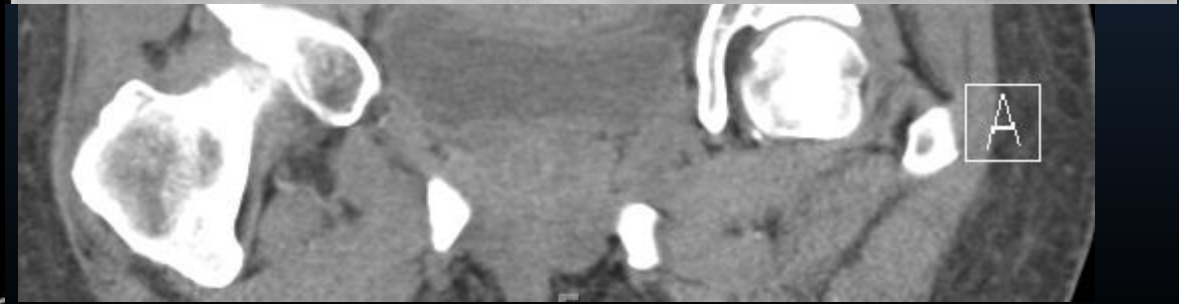
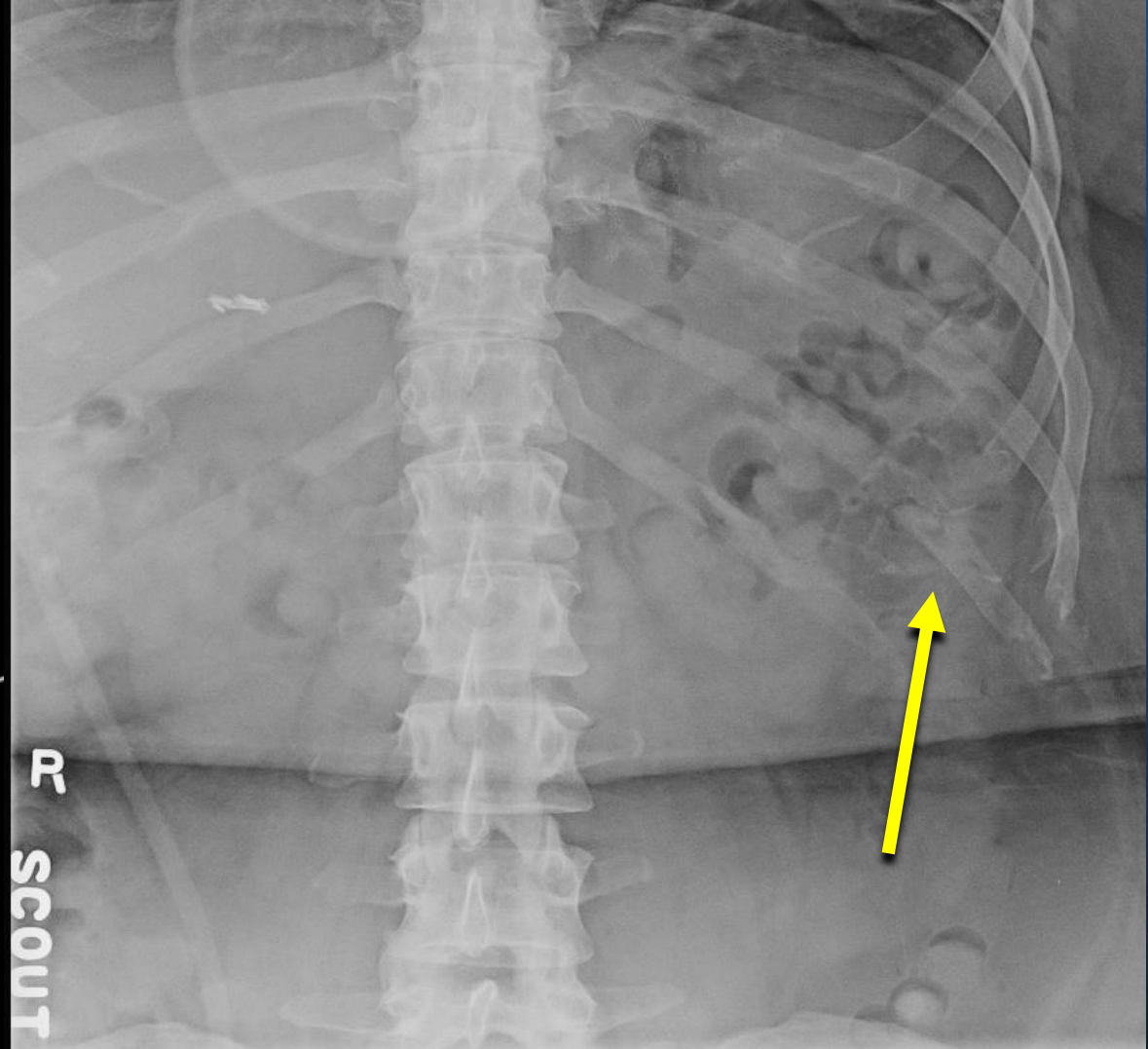
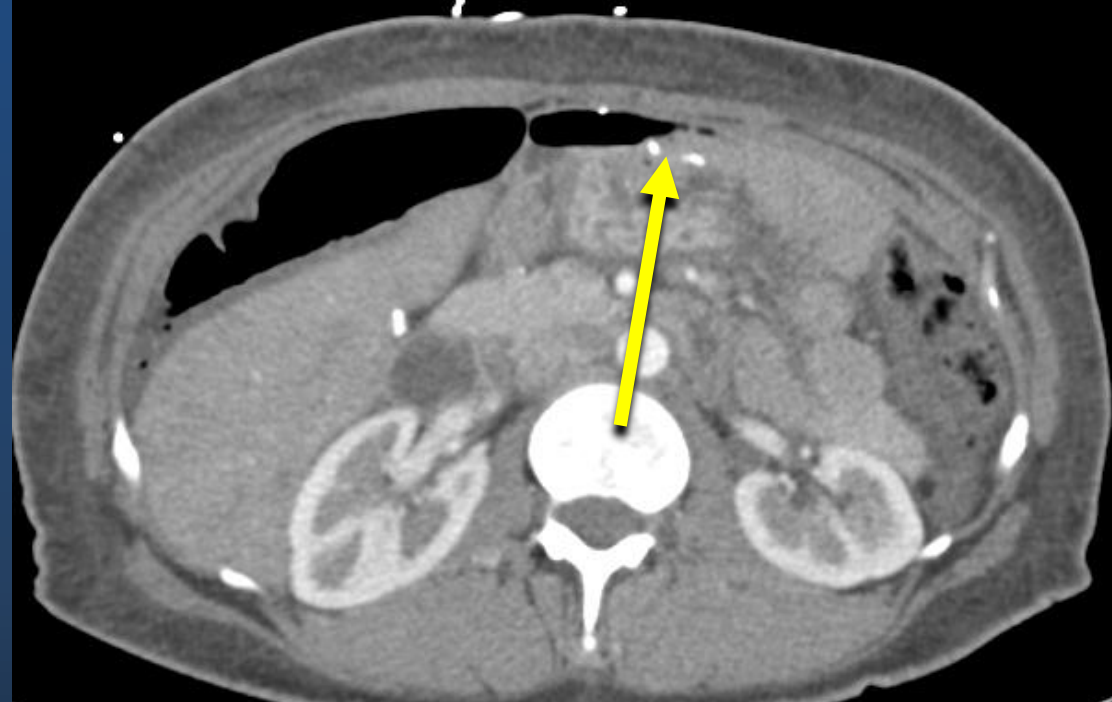
- Use began in 1990s
- Combination restrictive/malabsorptive
- Ante-colic vs retro-colic approach
- Early complications: leak/hemorrhage
- Late complications: internal hernia, marginal ulcer



Antecolic



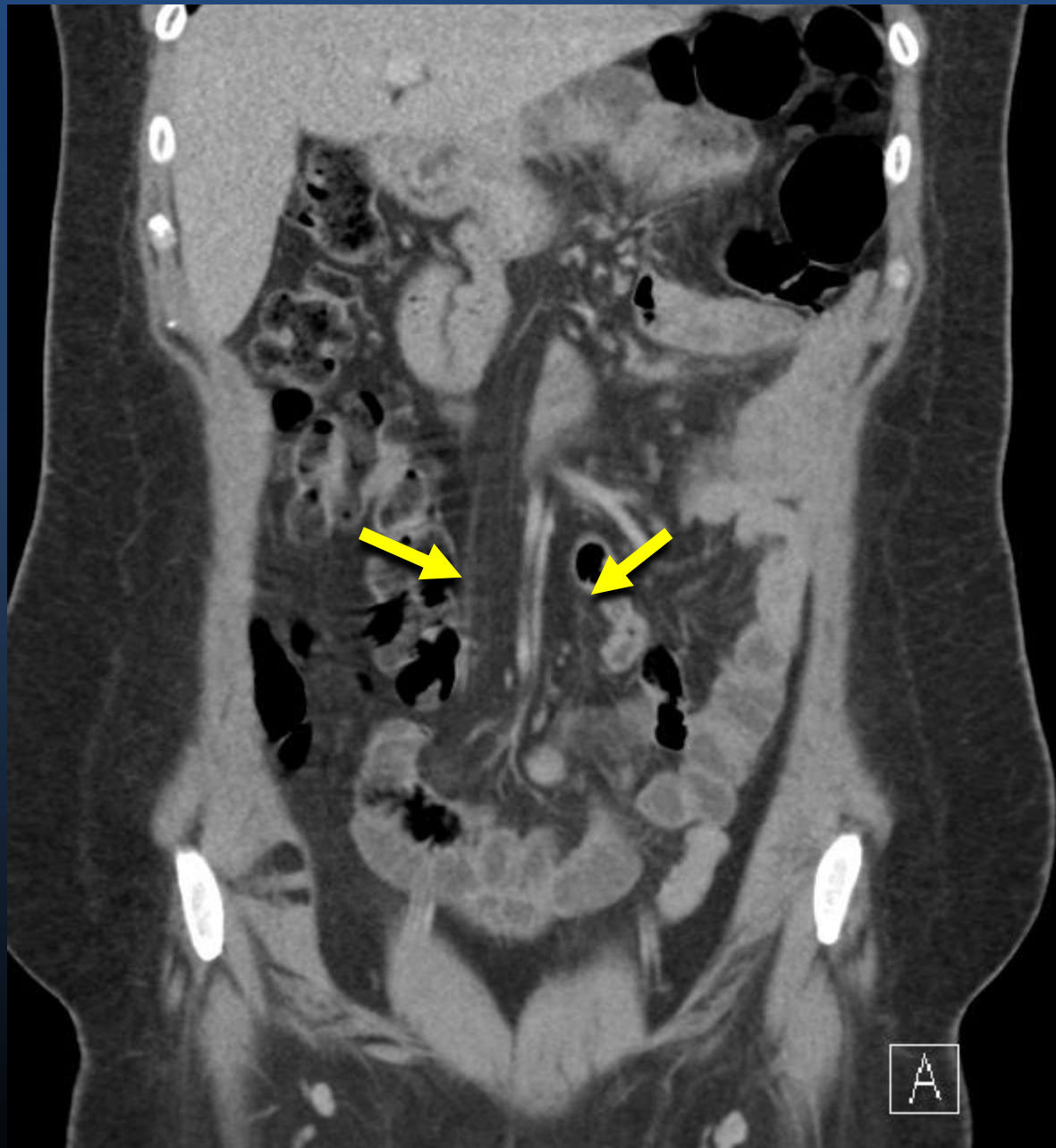
Retrocolic

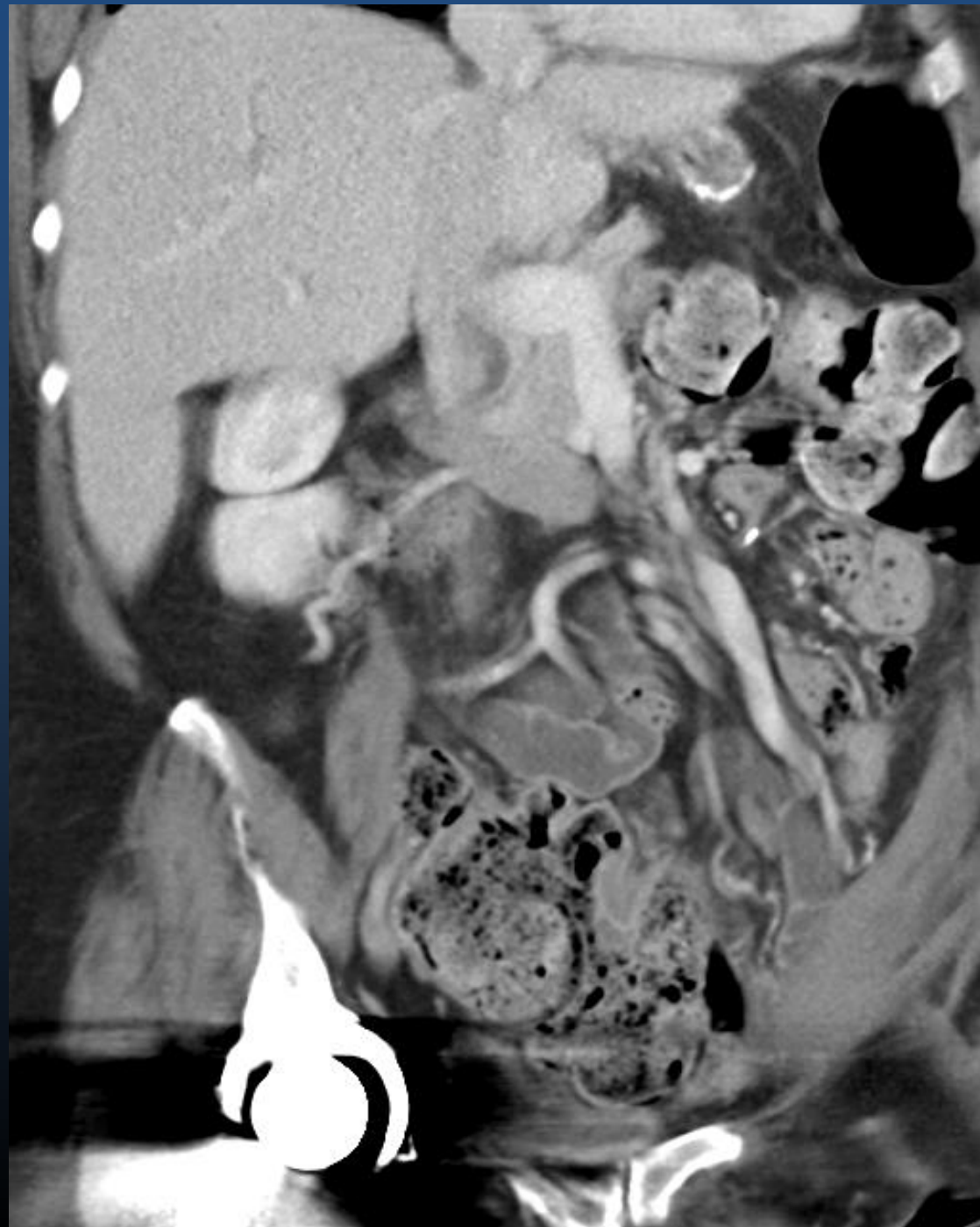
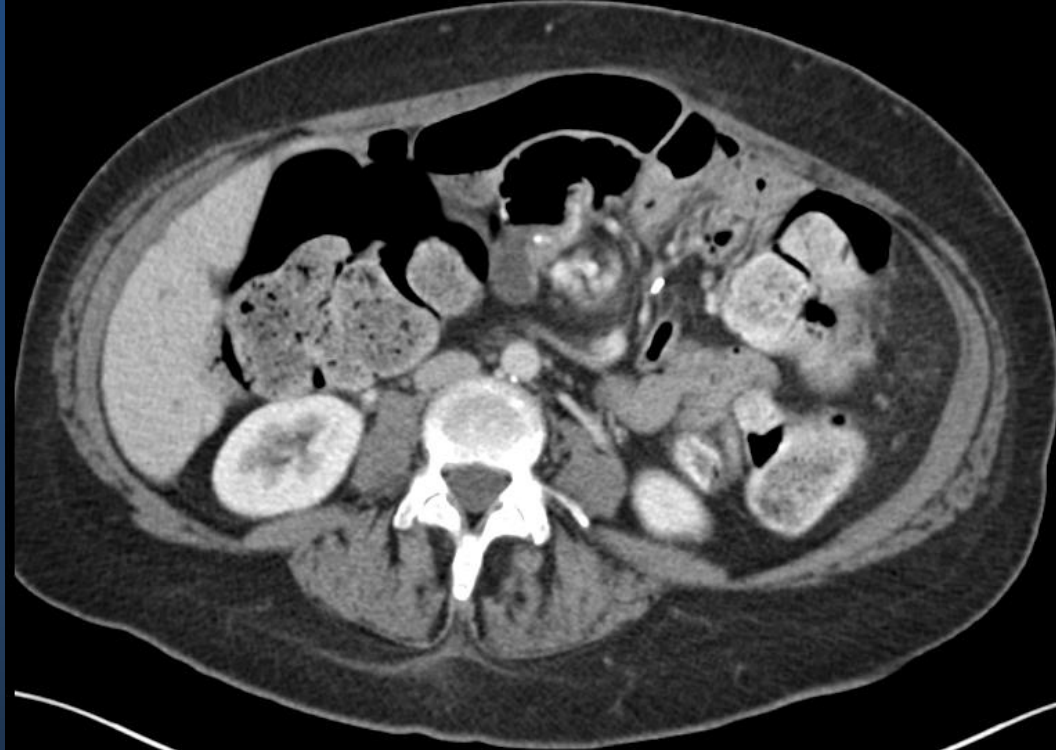


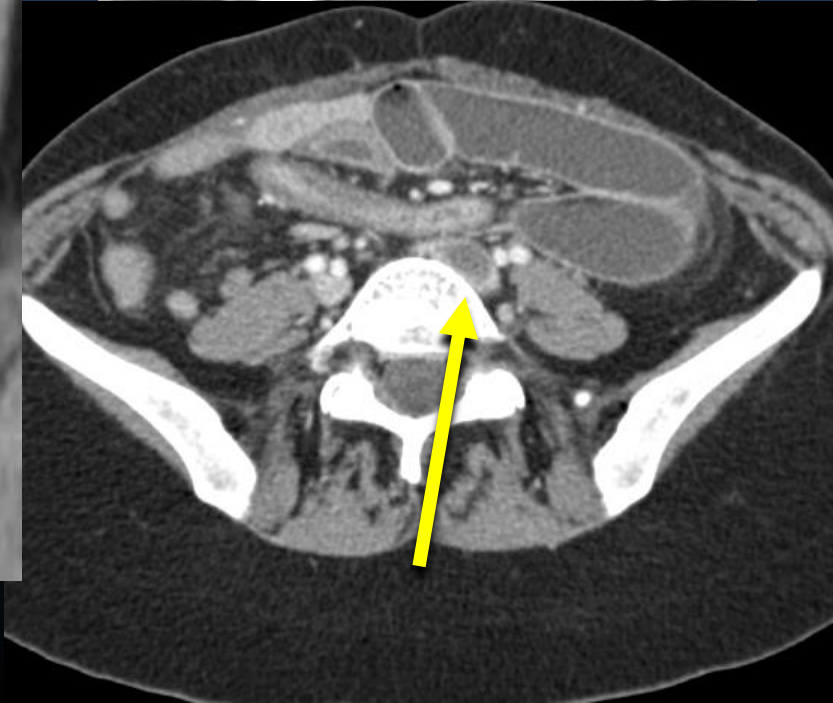
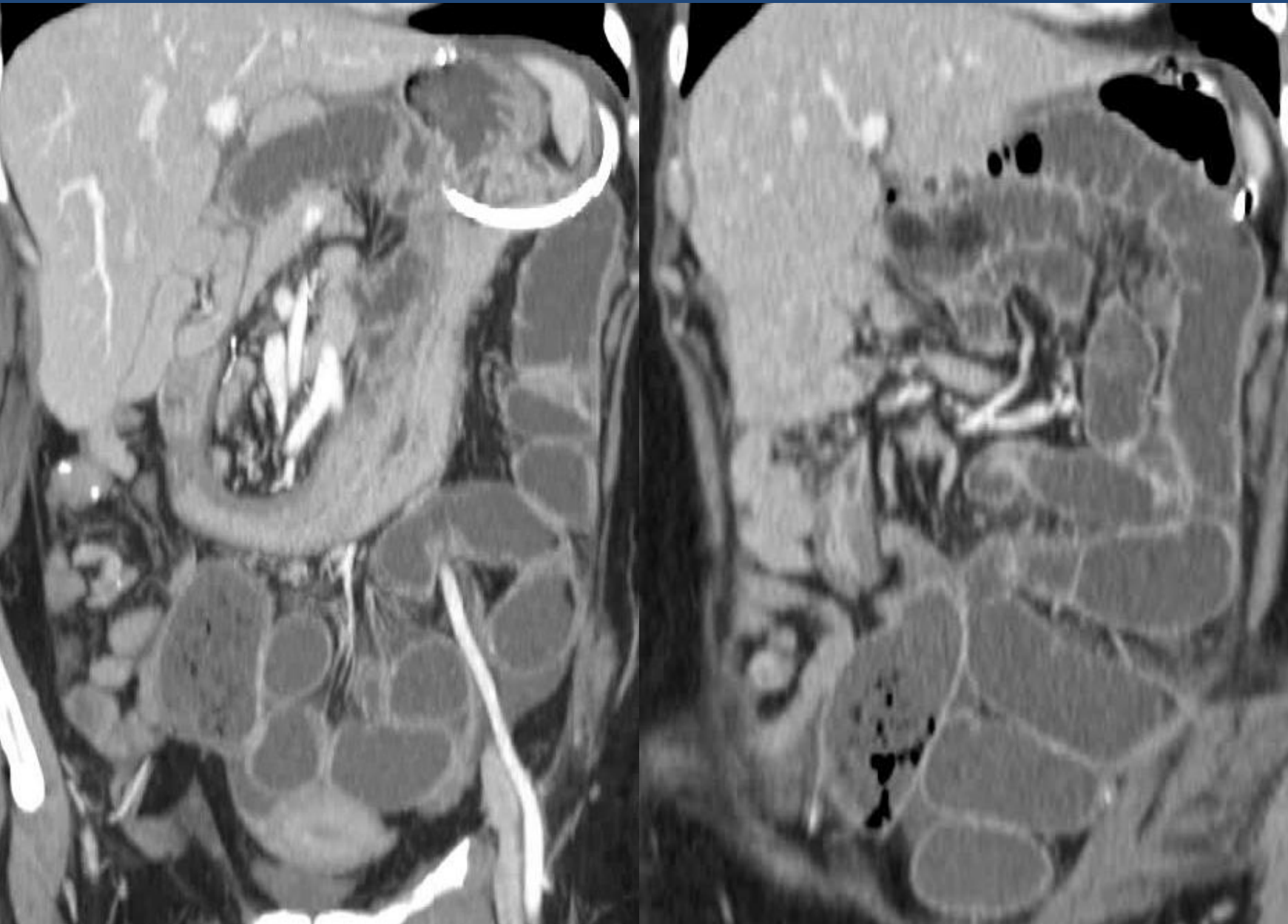
SCOUT

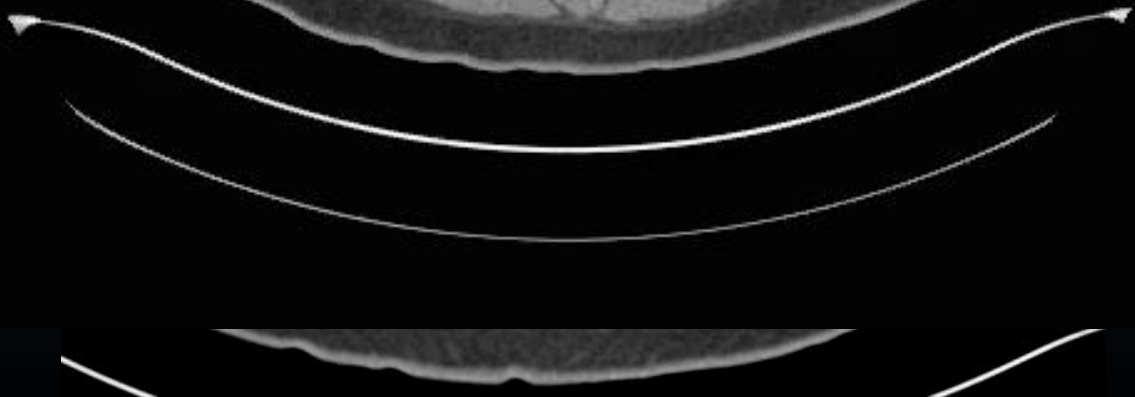
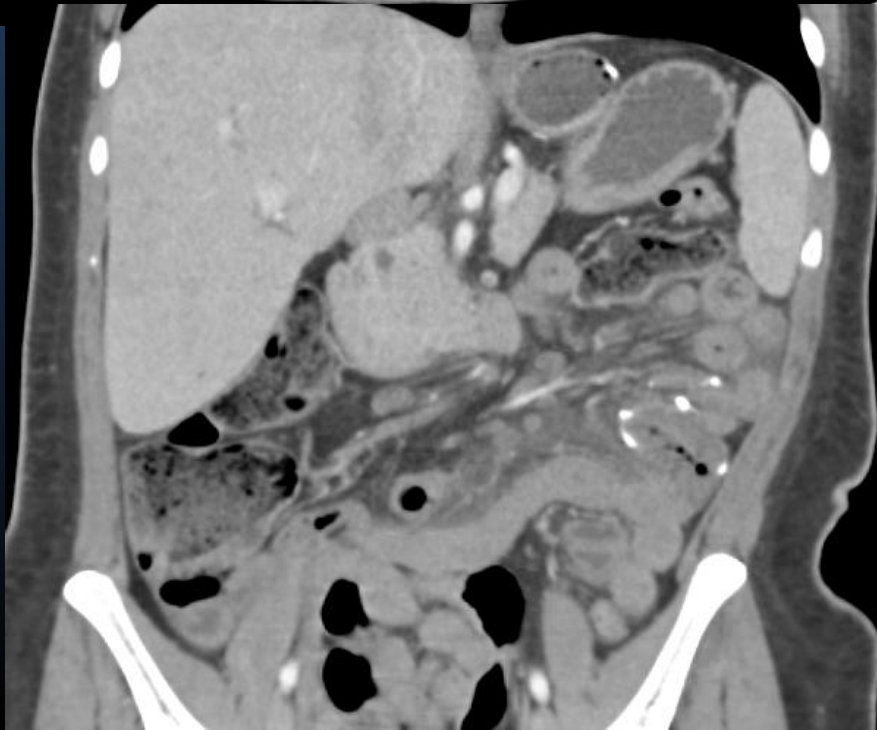
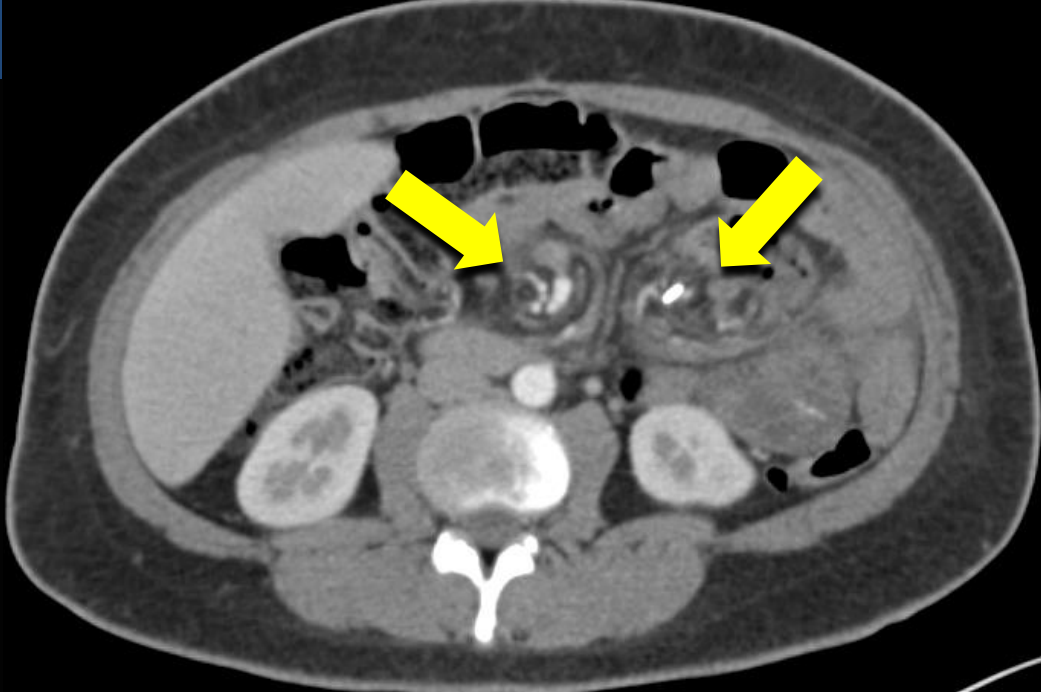
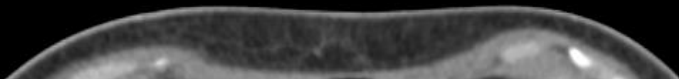
Imaging Signs of Internal Hernia

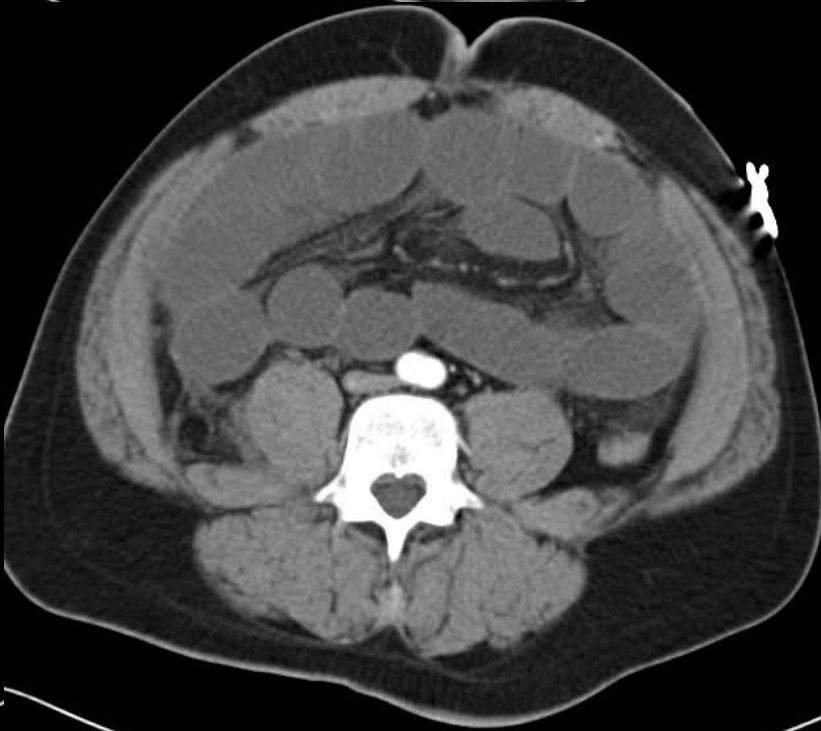
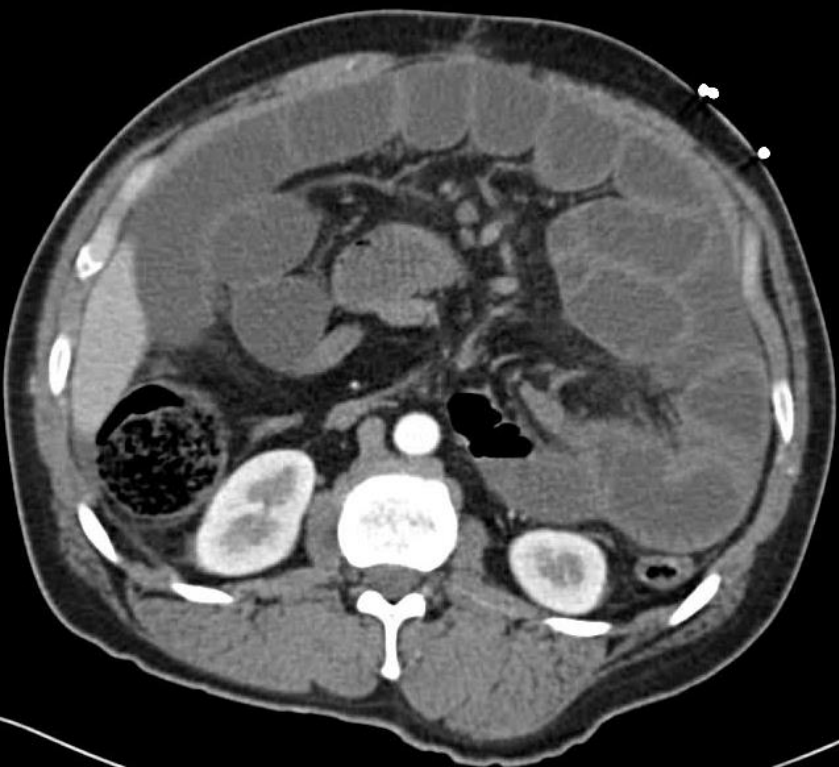
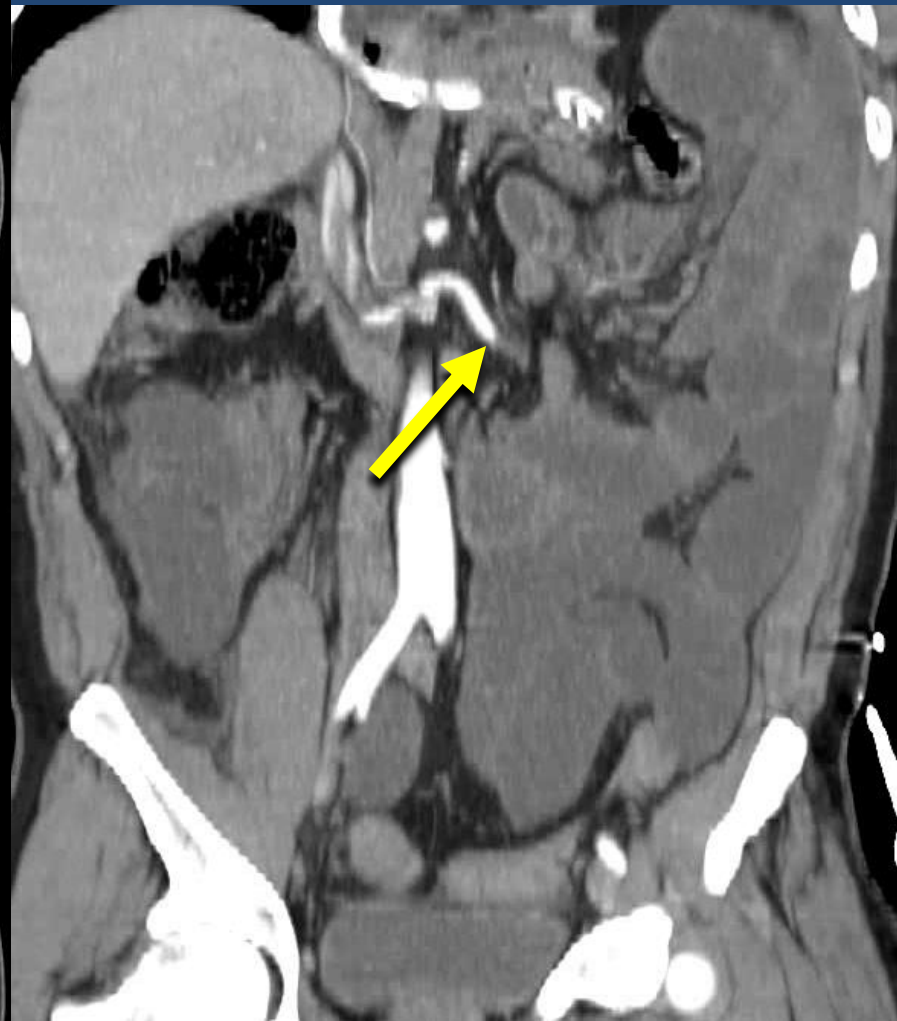
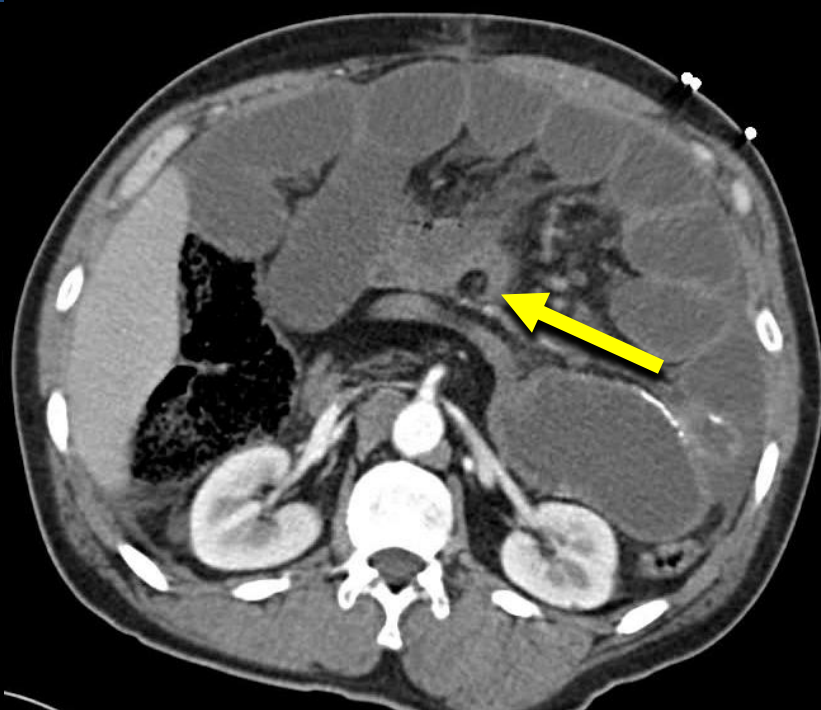
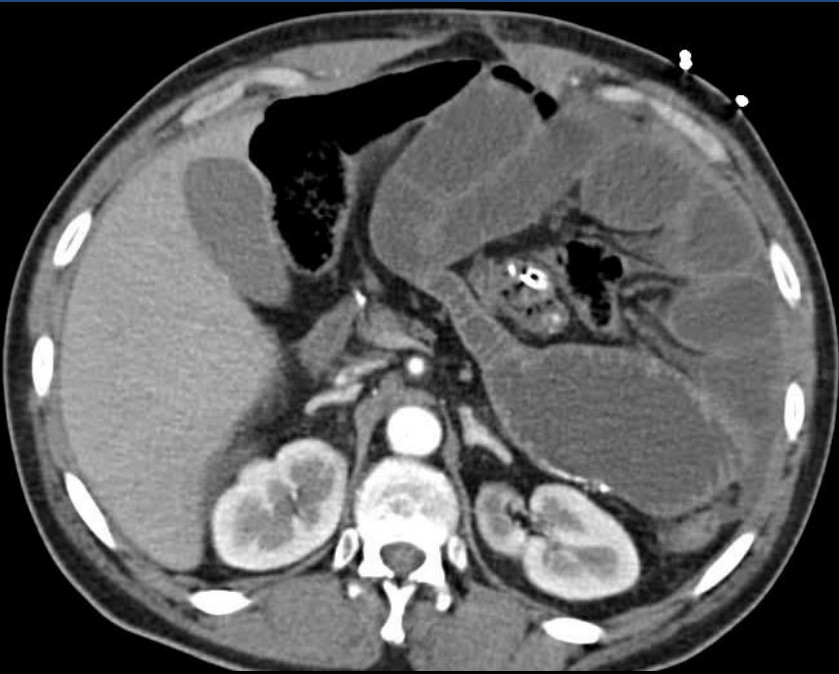
- “Mesenteric swirl” – most sensitive
- Loops clustered together in abnormal location
- Bowel/mesentery passing between aorta and SMA
- Mesenteric edema
- “Mushroom sign”
- Shifting anastomosis
- May/may not have CLO or volvulus

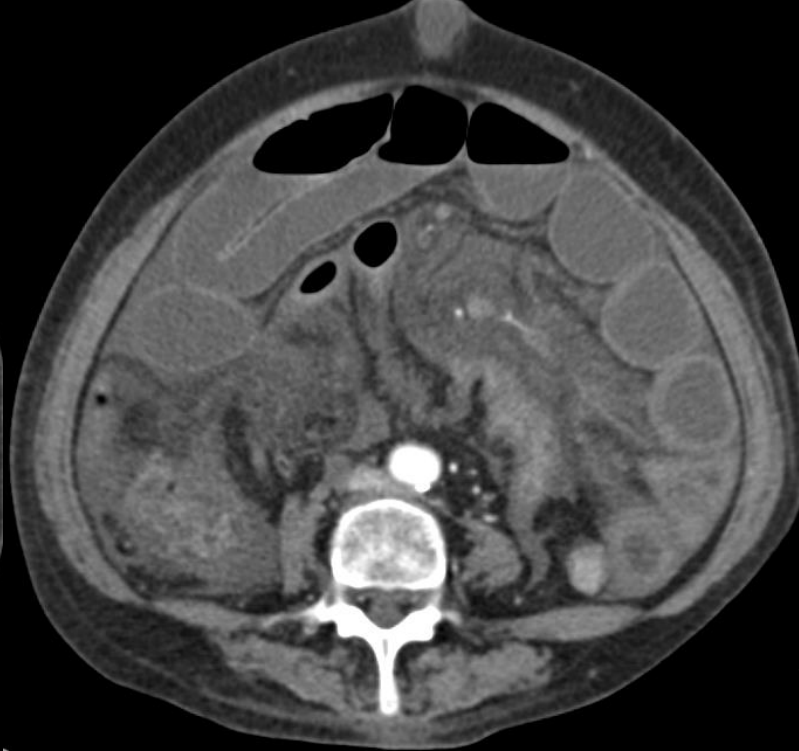


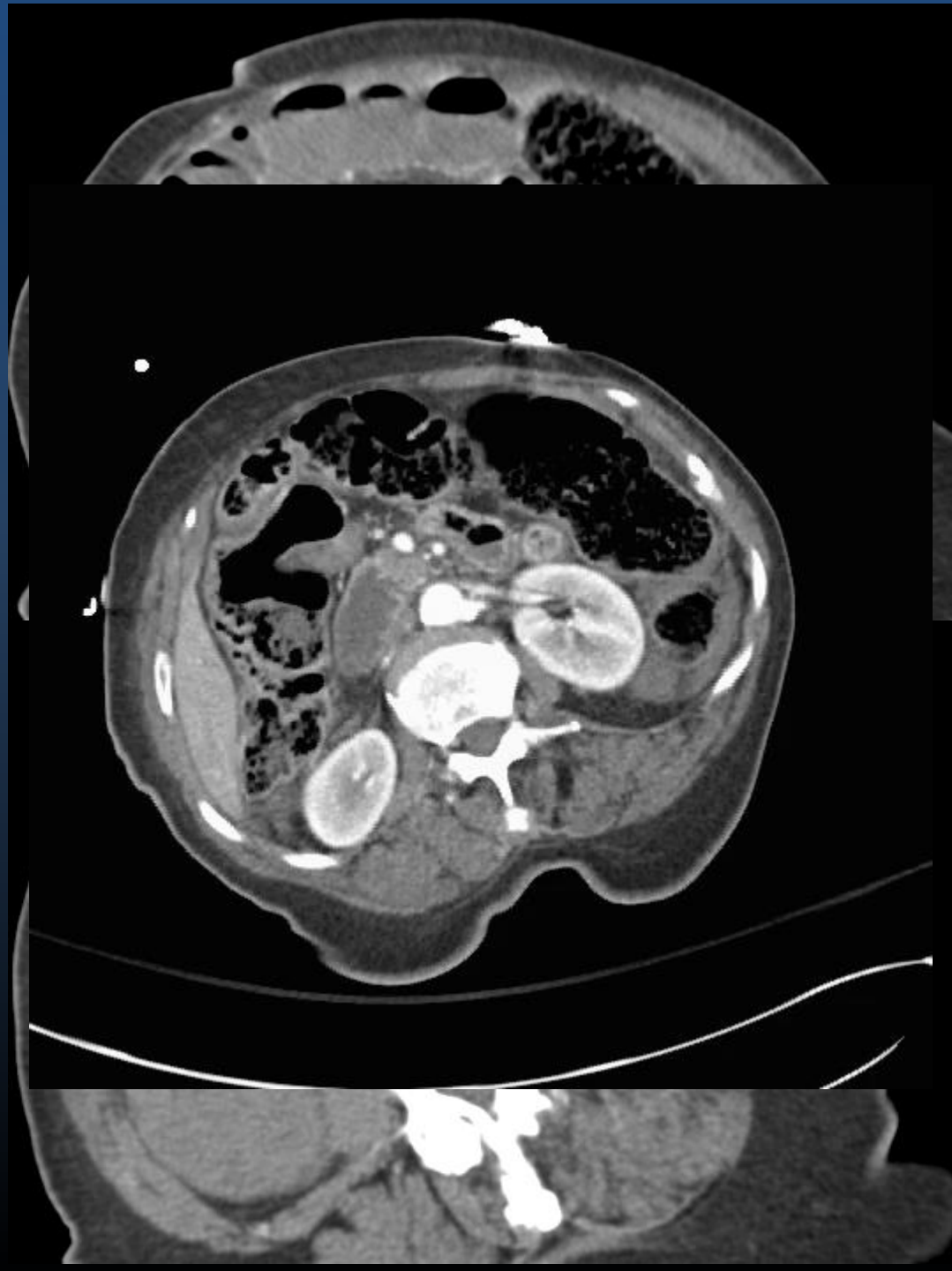


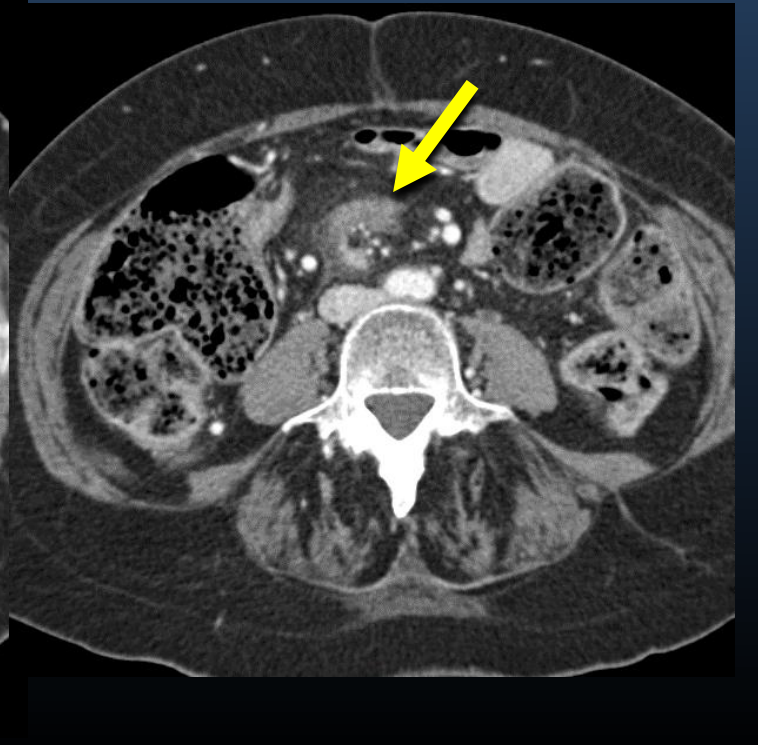
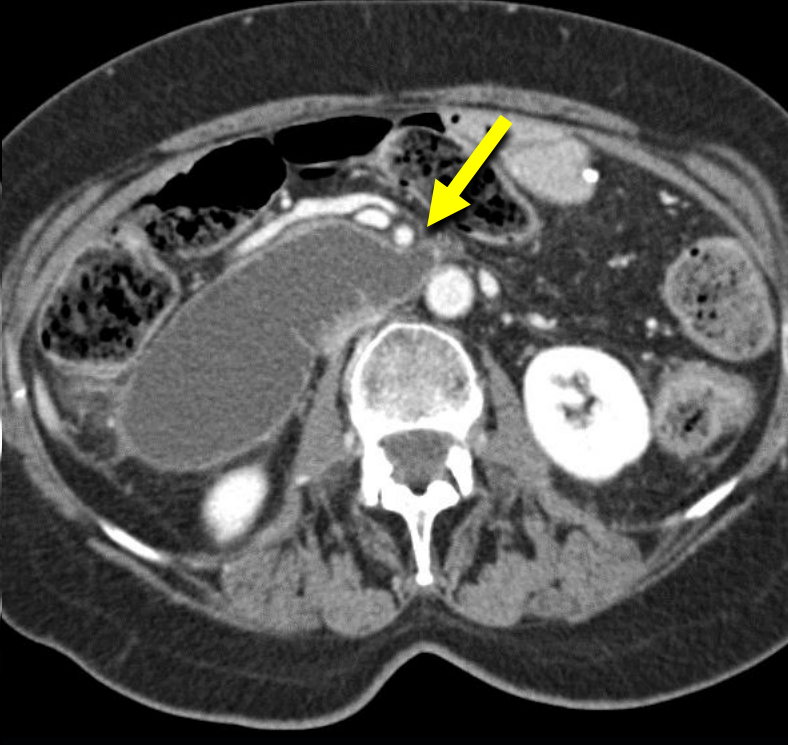
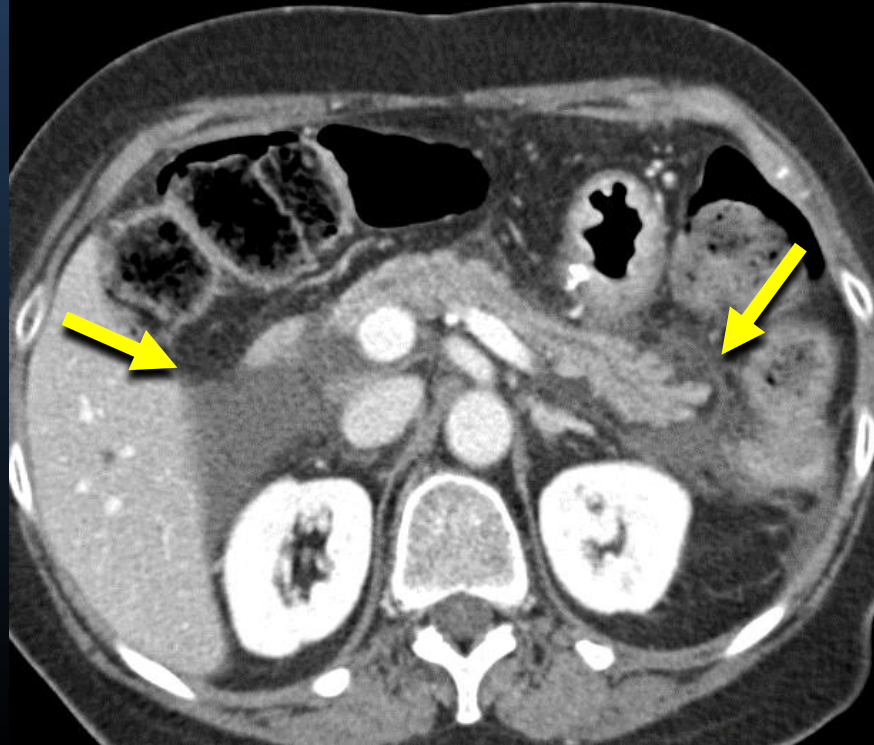
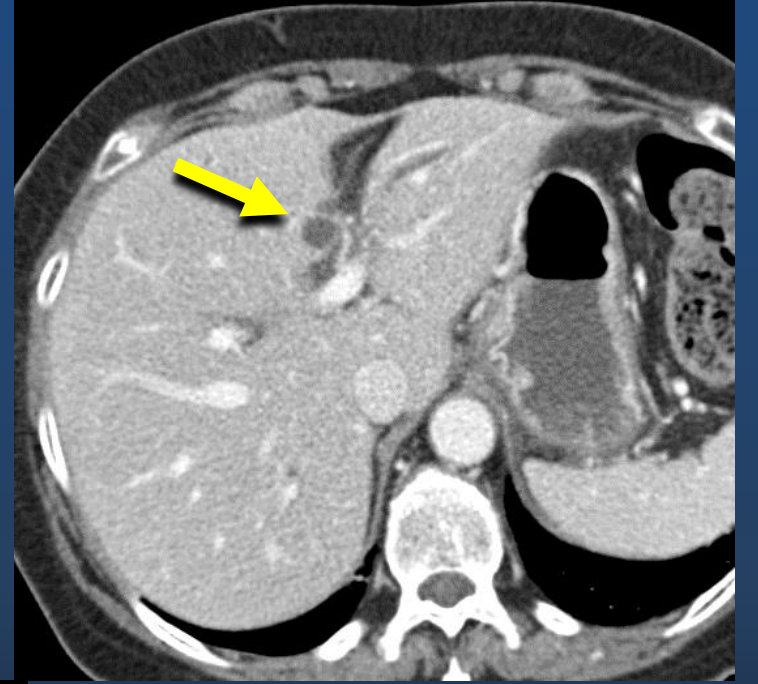
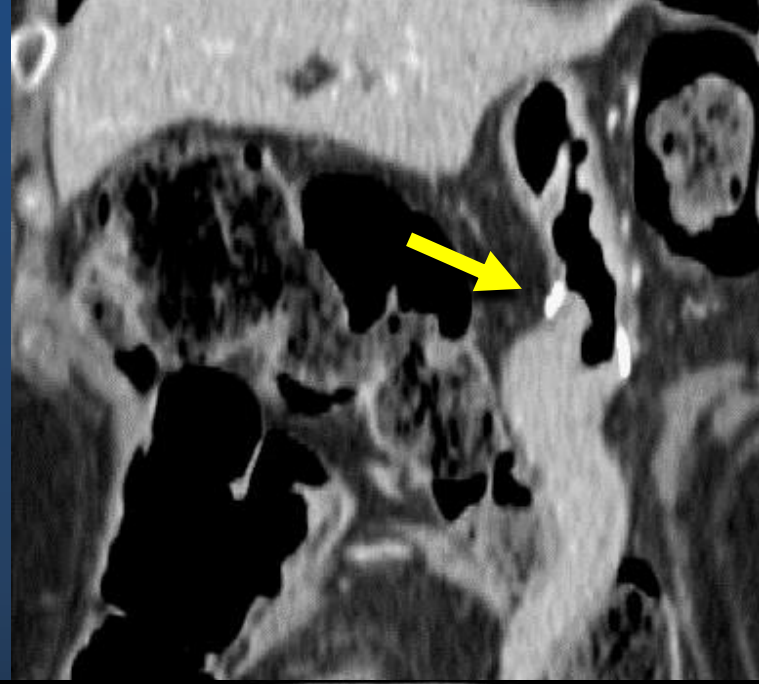
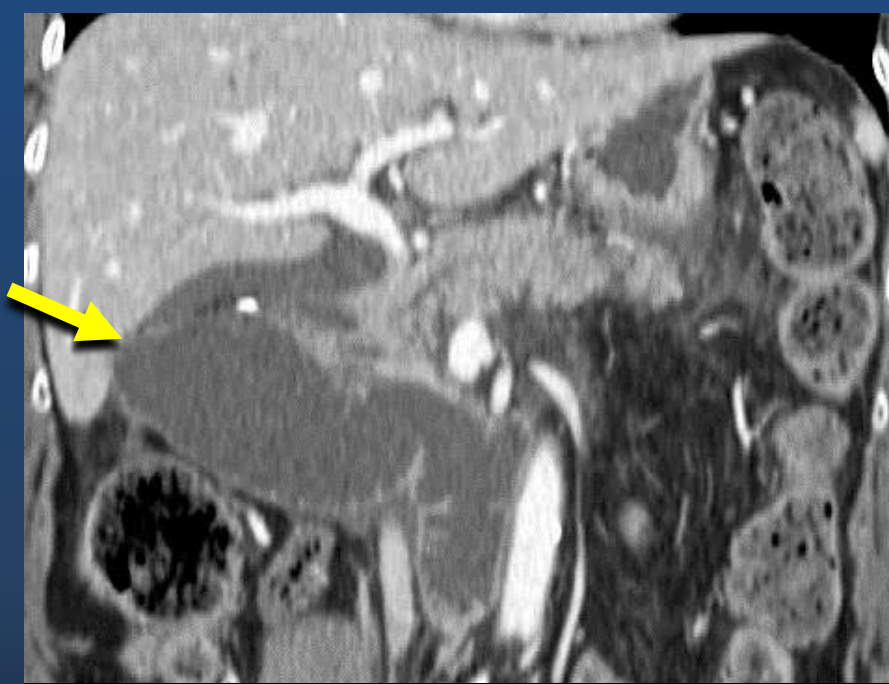


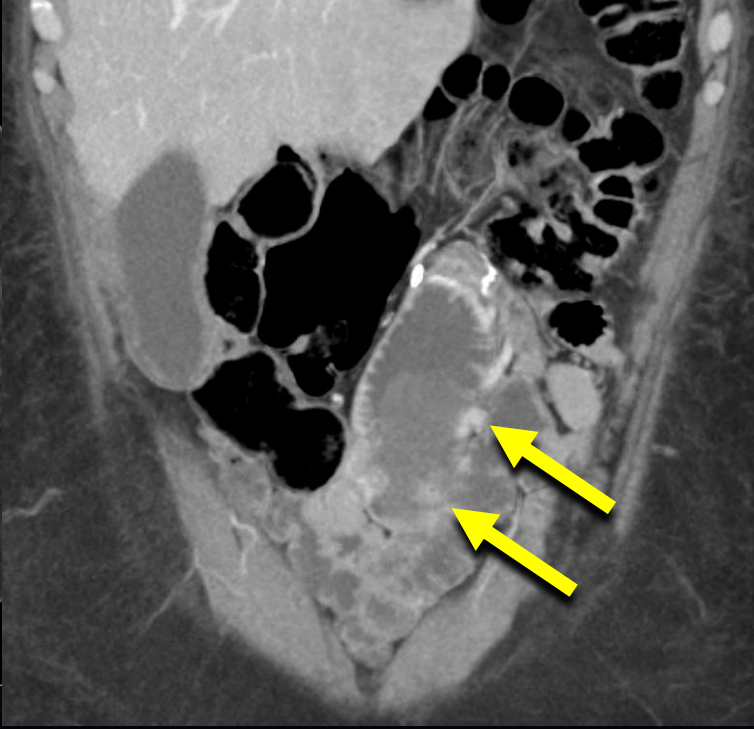
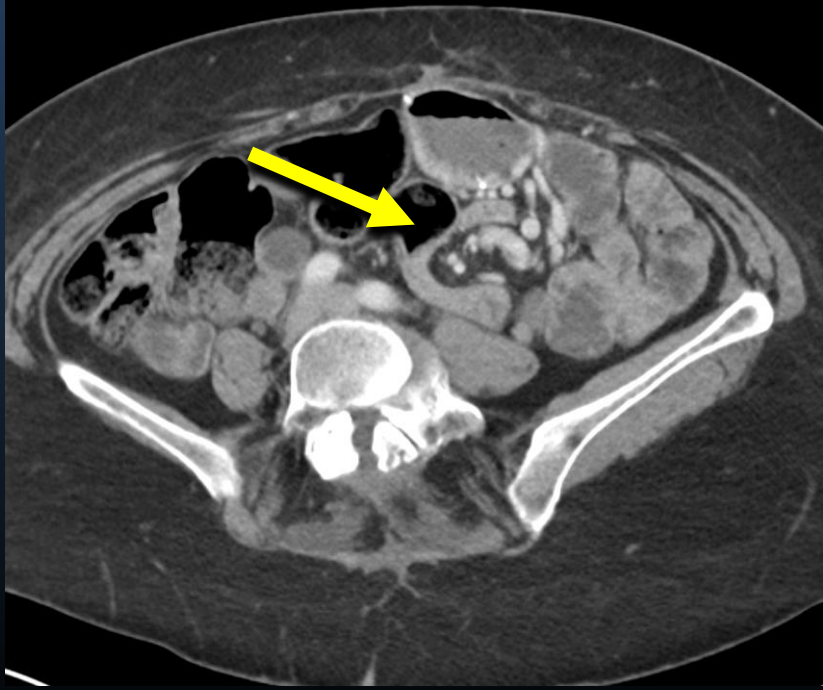
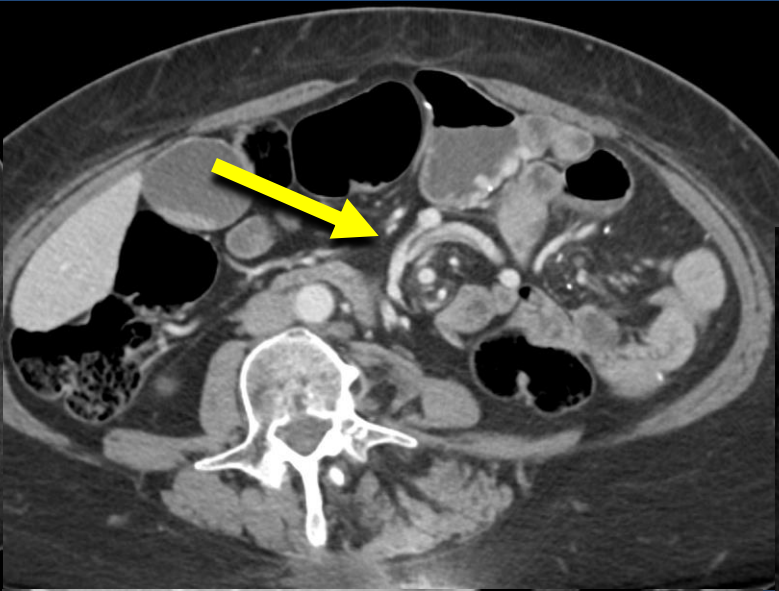
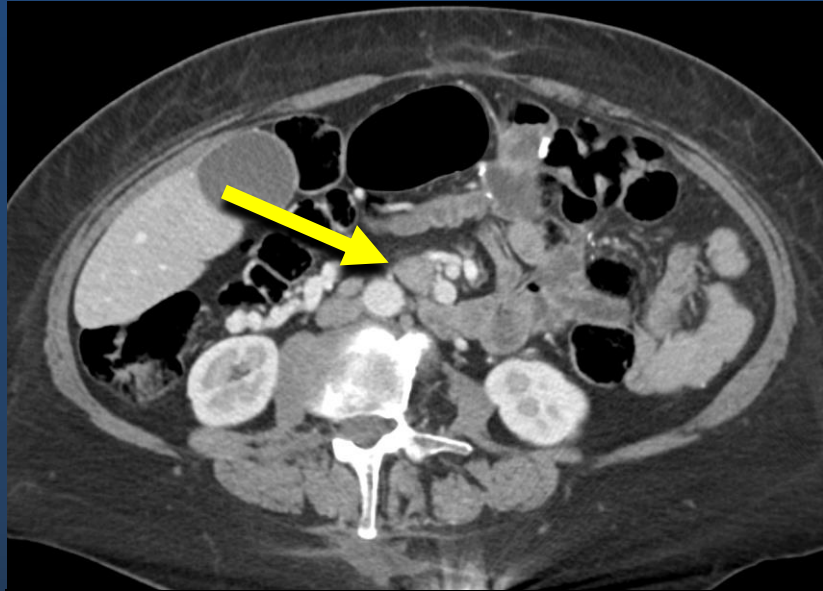






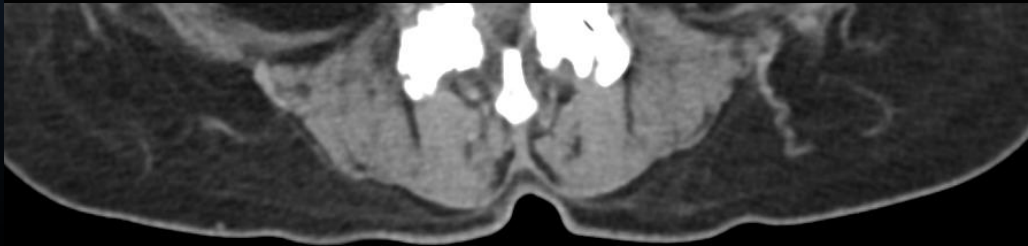
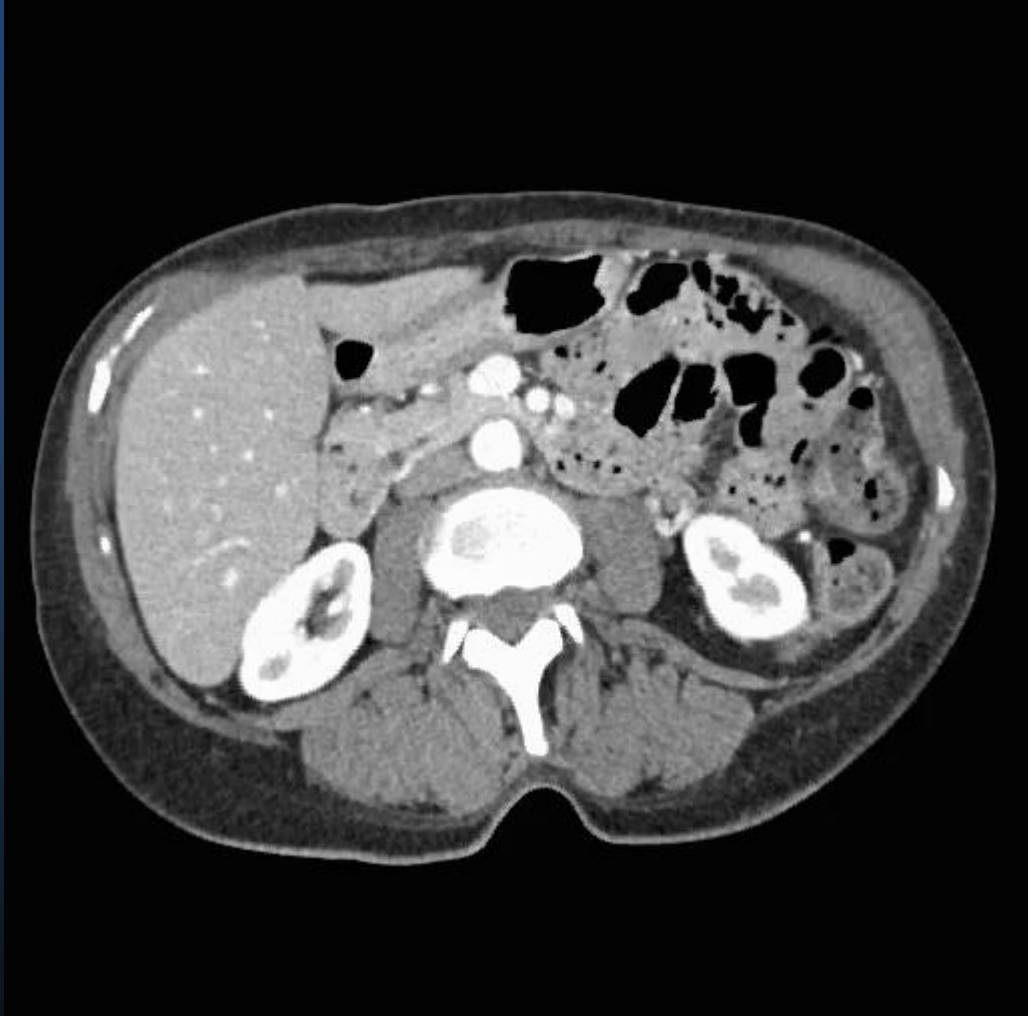
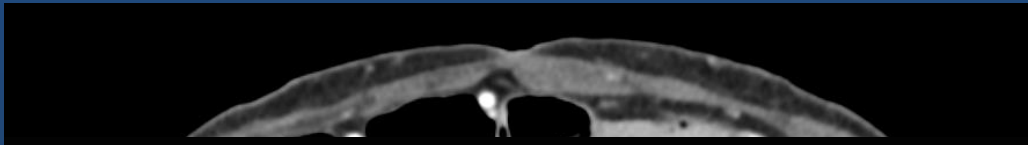






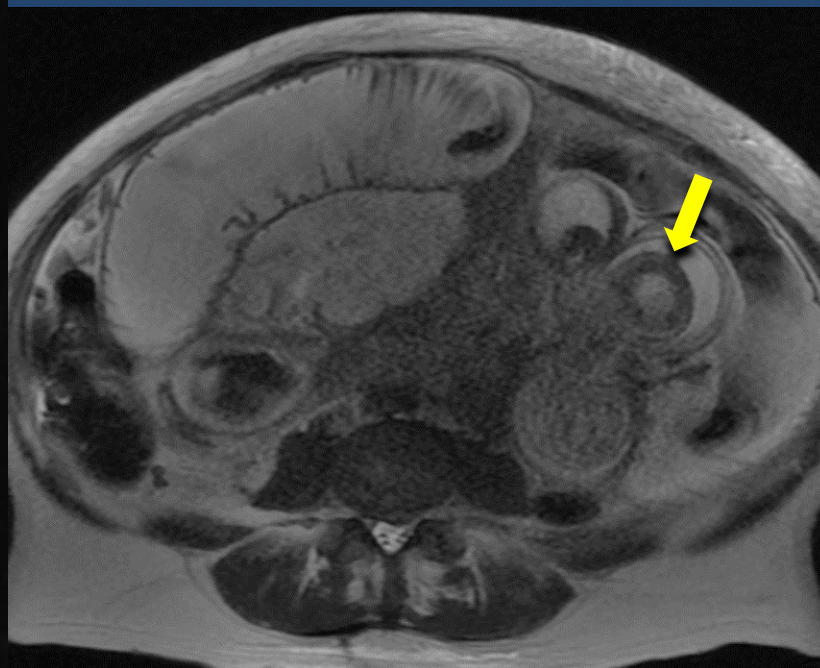
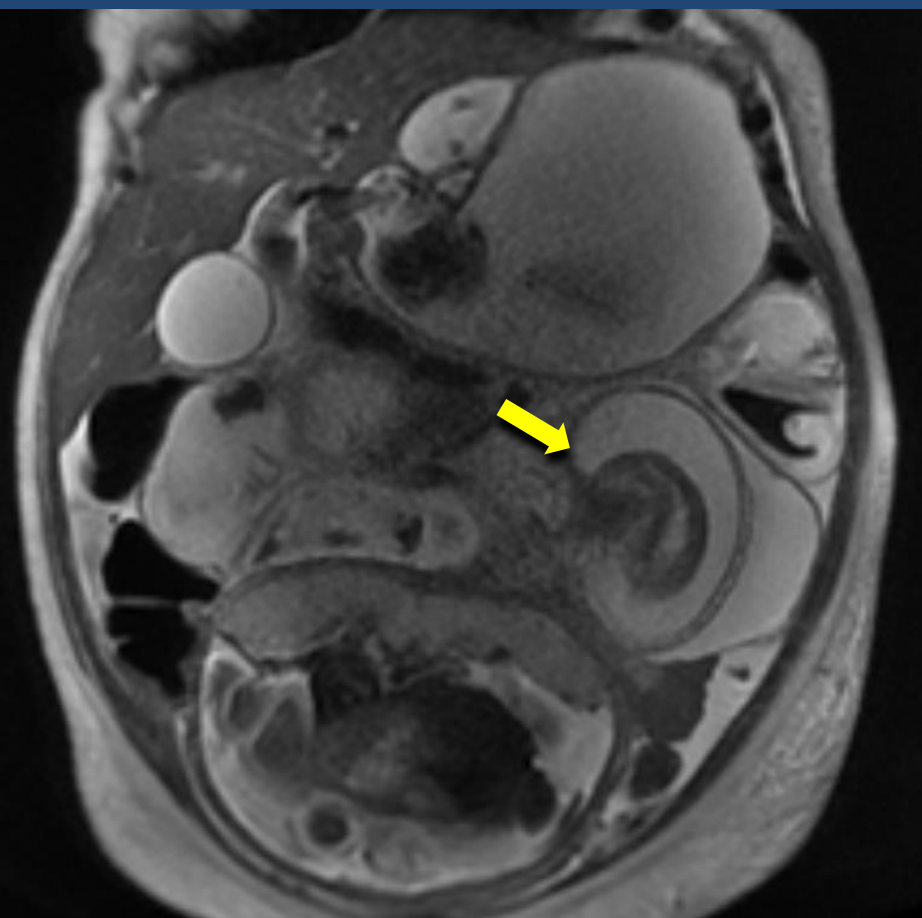
Internal hernia hints

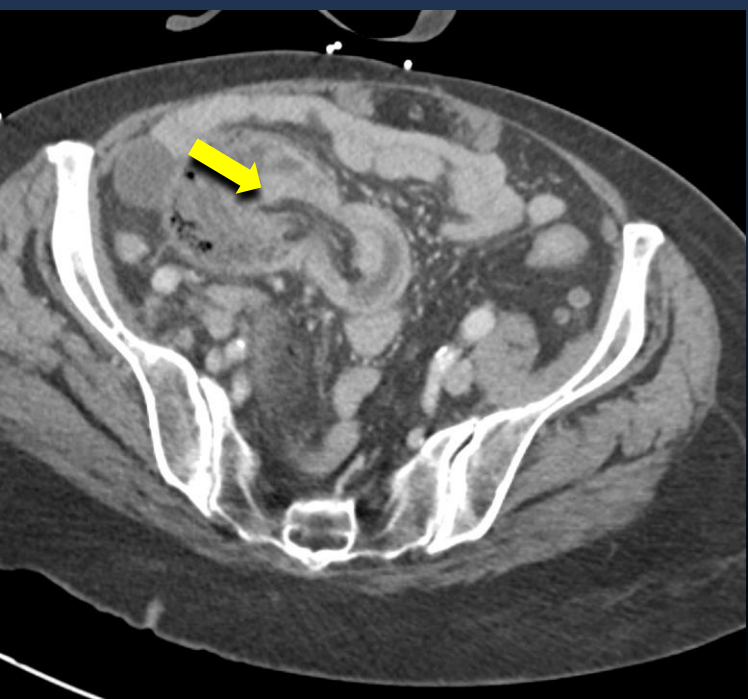
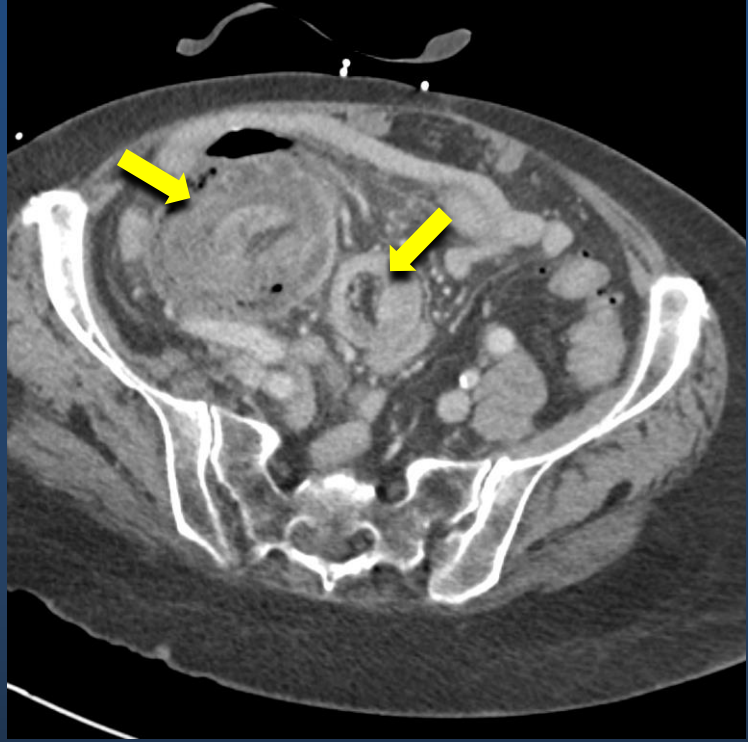
- Important because of high risk for CLO/ischemia
- Not gastric bypass? Consider adhesion unless clear anatomic sign
- Gastric bypass?
 - Mesenteric findings sensitive
 - Bowel behind SMA
 - Shifting anastomosis
 - Bowel may not be dilated



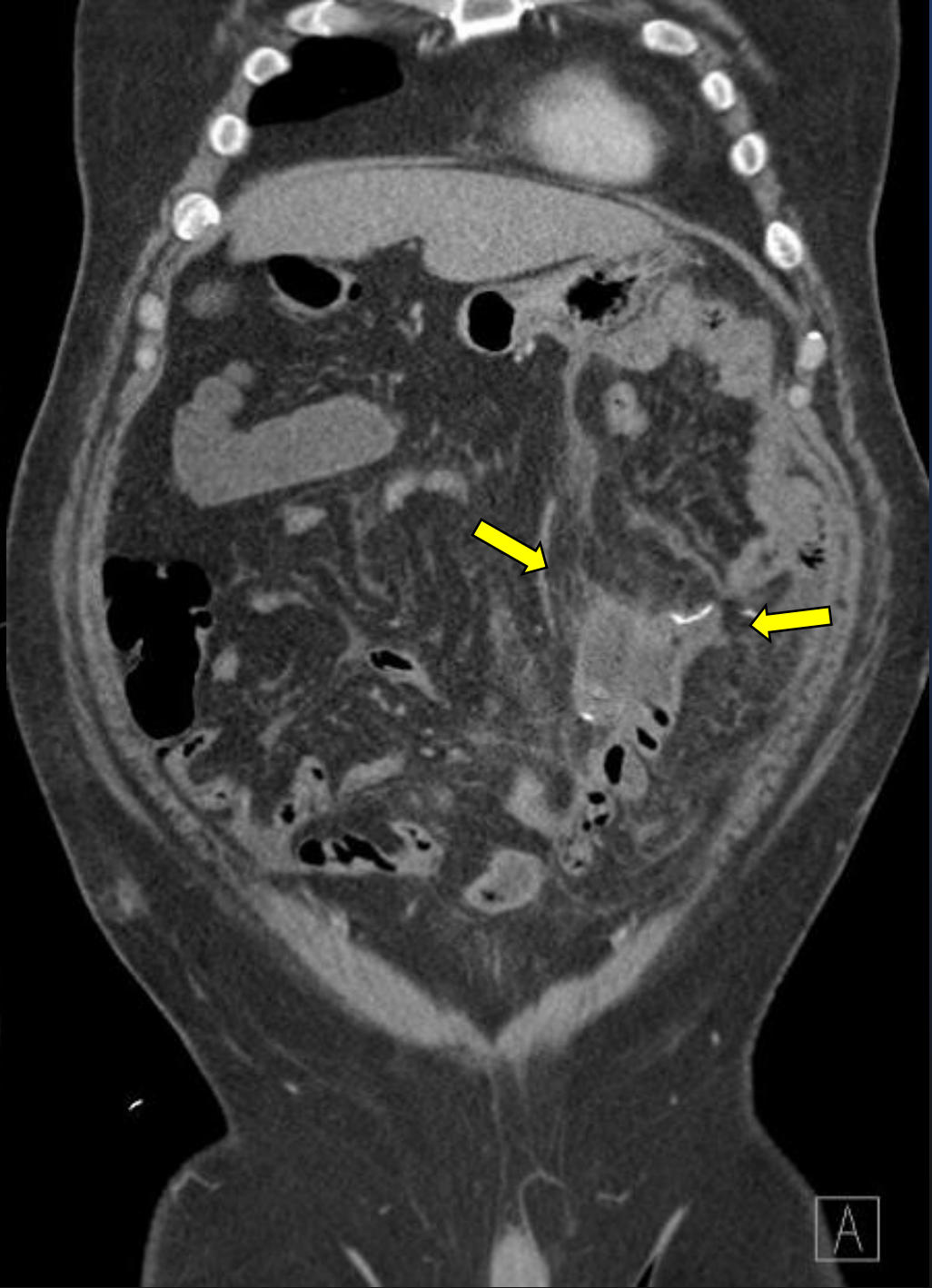
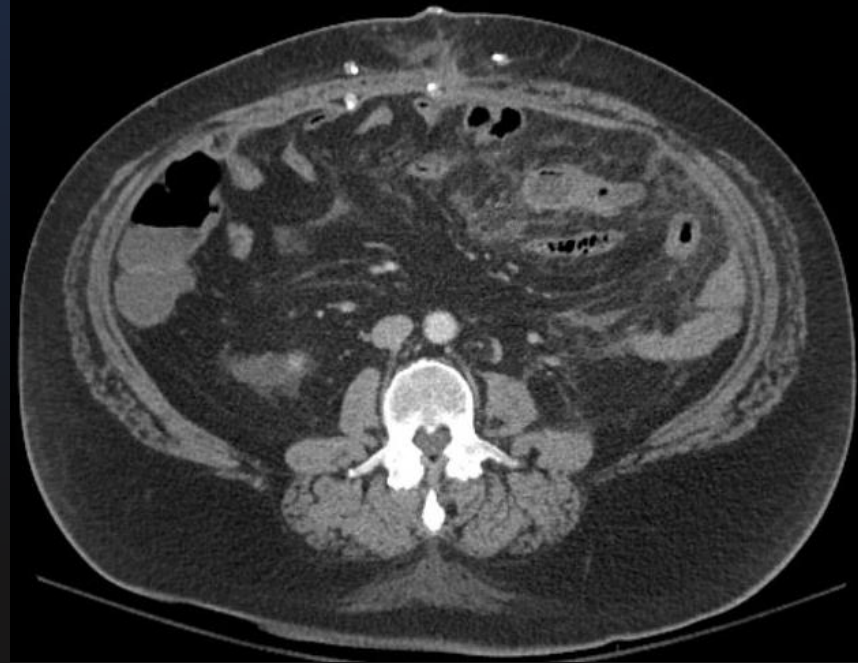
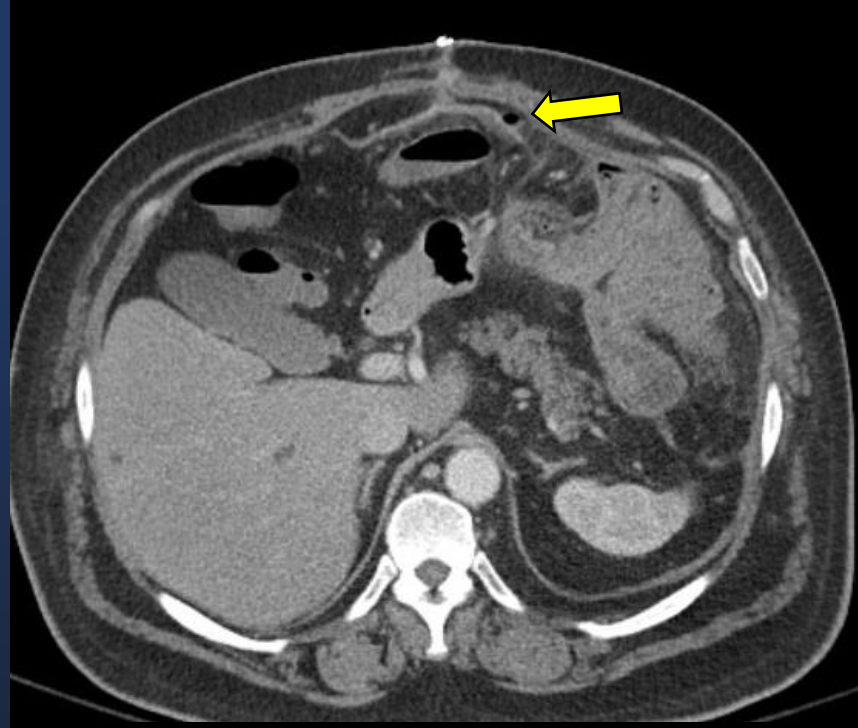
Mesenteric Swirling on CT

- If SBO is present, helpful in predicting need for surgery
- What about no SBO?
 - Counterclockwise swirling of bowel can be normal in up to 1/3
 - Look for secondary signs
 - Gastric bypass – be careful





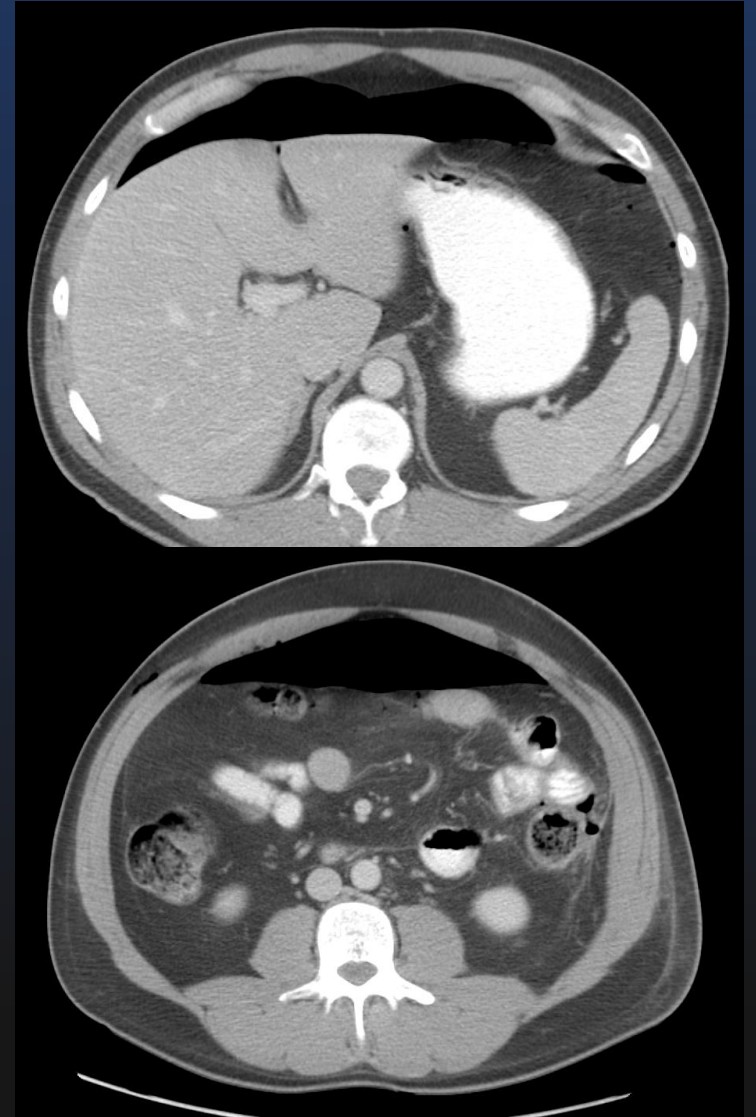
3 days post-op



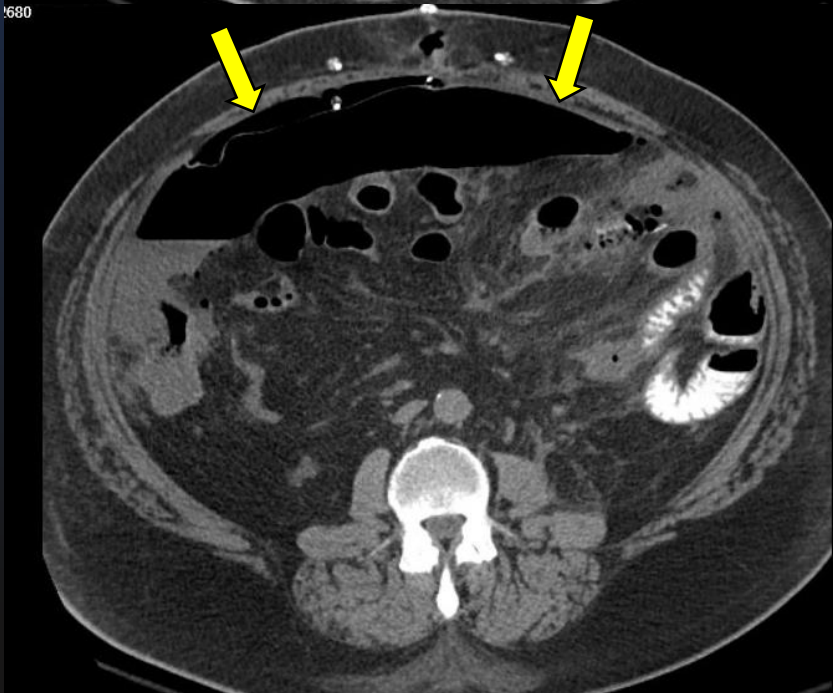
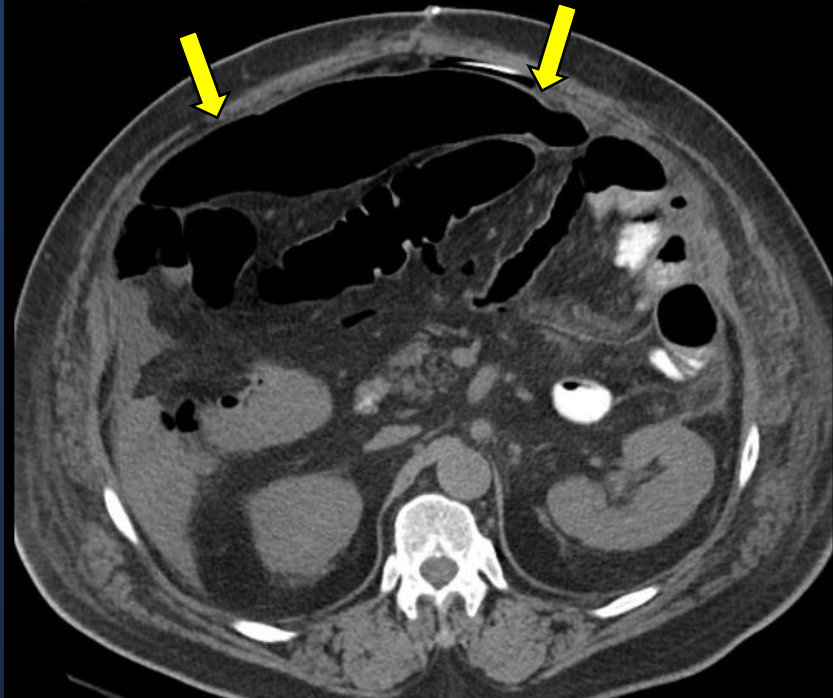
A

Post-Operative Pneumoperitoneum

- After abdominal surgery:
 - Most resolved in 5 days
 - Up to 9 days post-op on radiograph
 - Up to 2 weeks on CT
- Open > Laparoscopic
- Volume/Ancillary findings
- Clinical picture

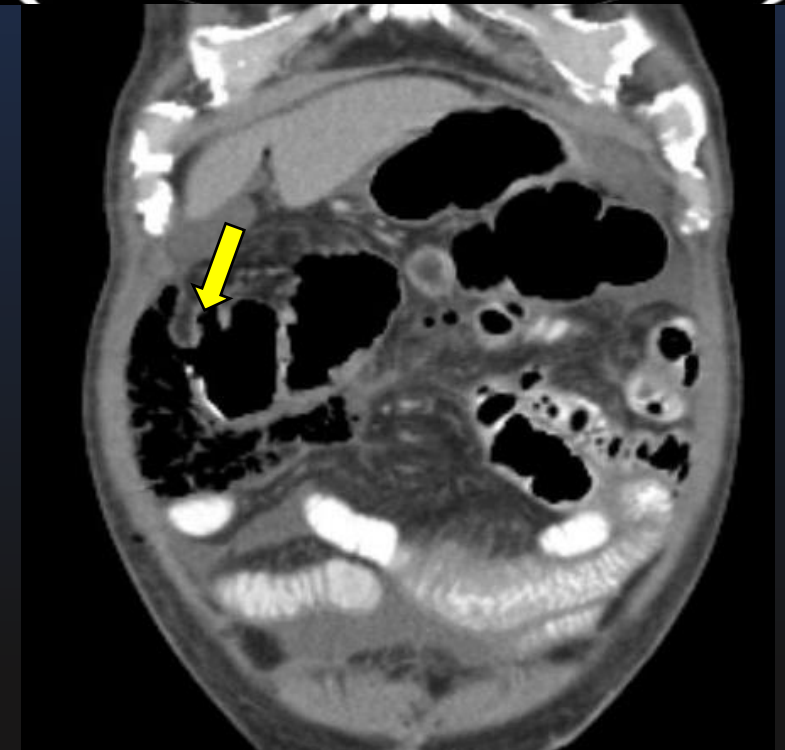
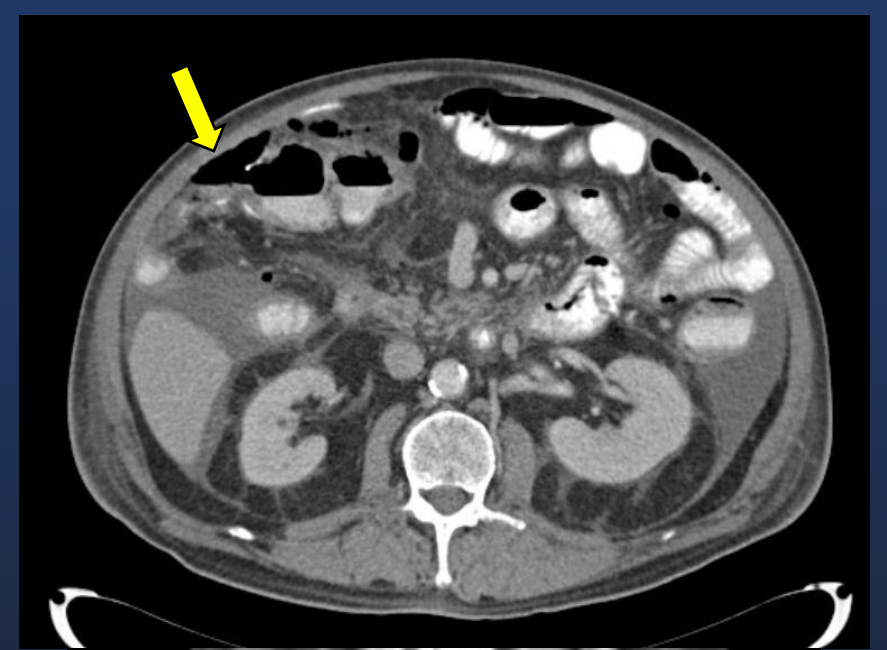


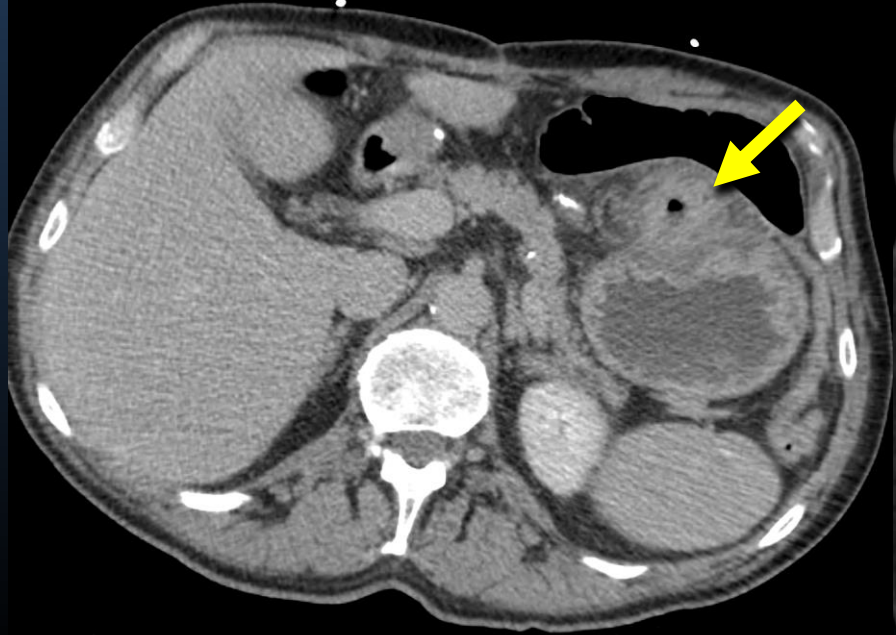
5 days post-op



Enteric Anastomotic Leaks

- Often present within first week post-op but can be delayed
- CT:
 - Overall sensitivity 65%
 - Free fluid, free gas sensitive
 - Leakage of intraluminal contrast specific



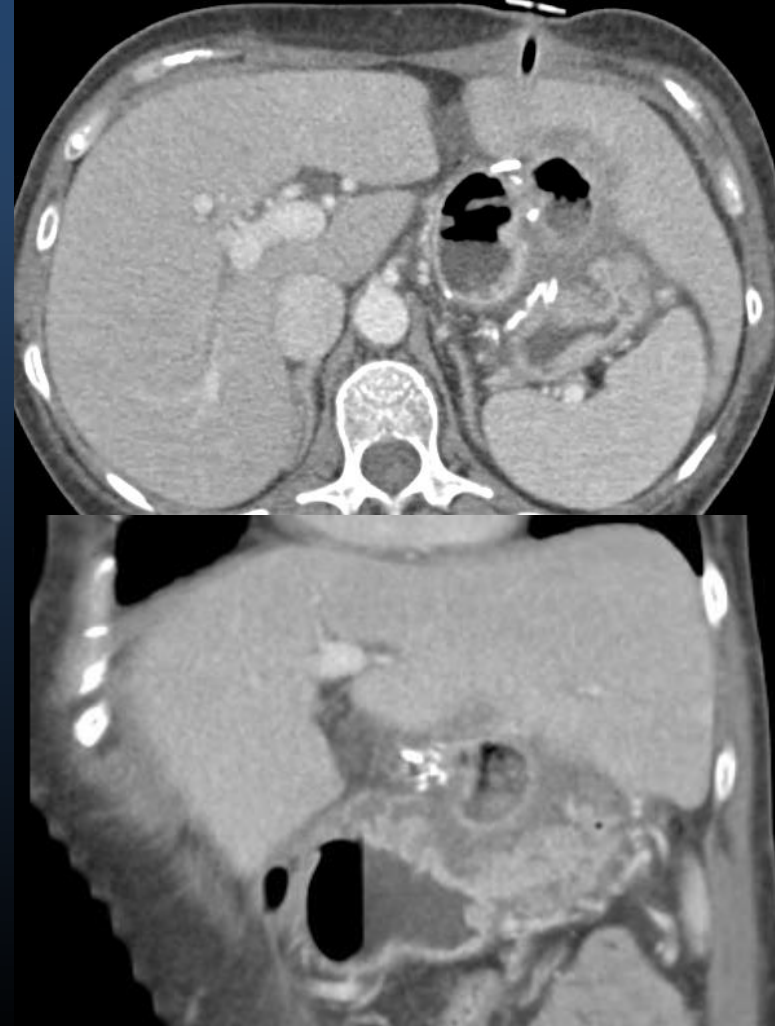


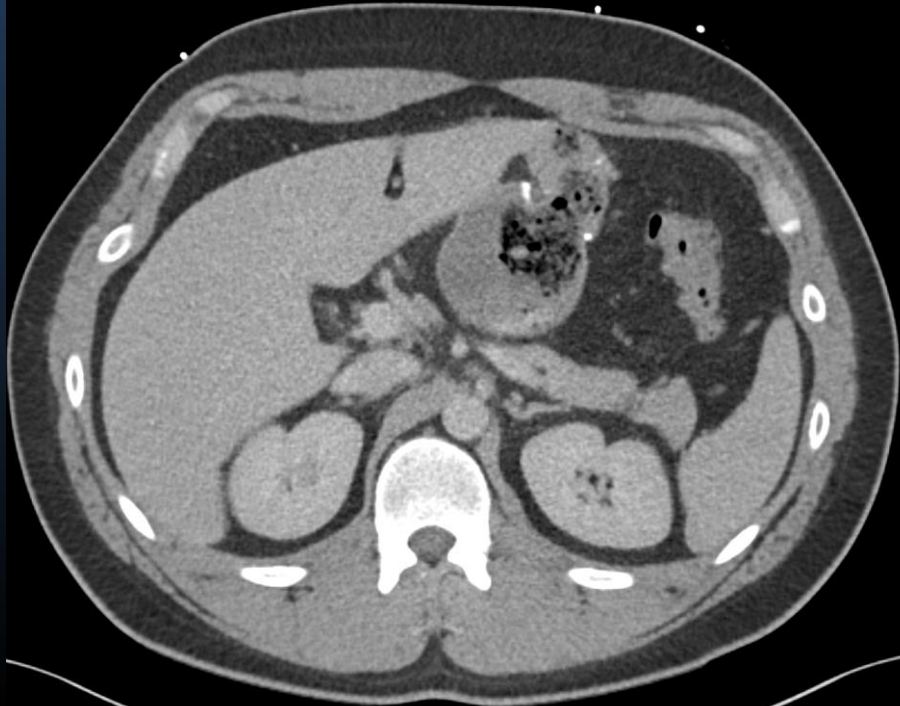
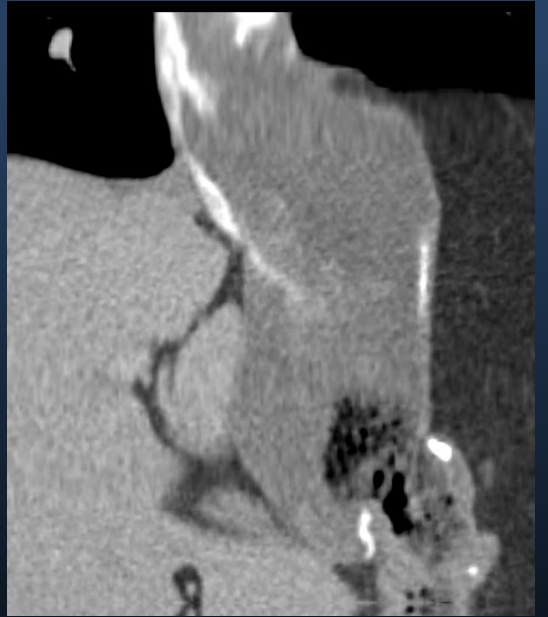
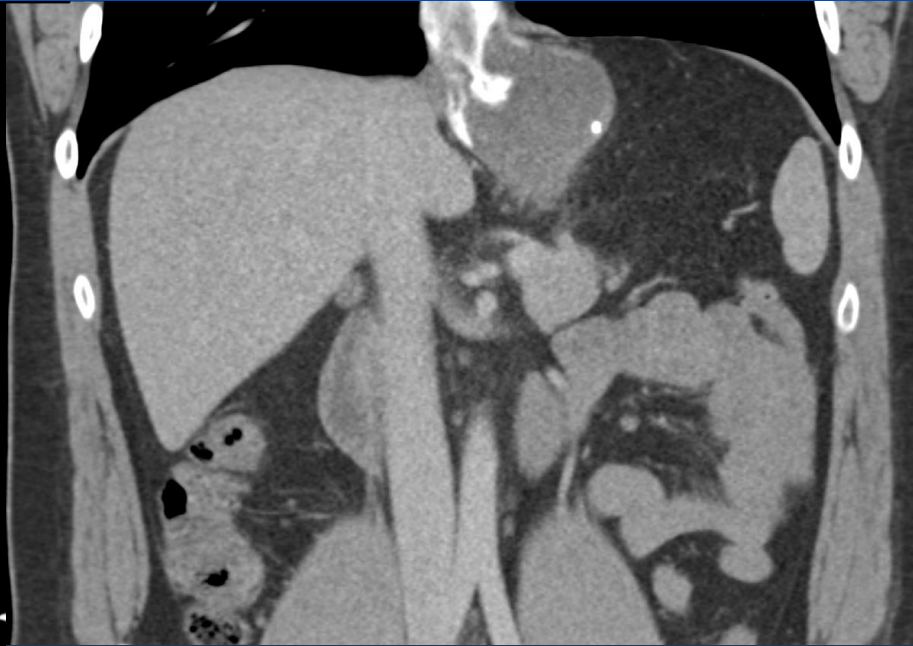
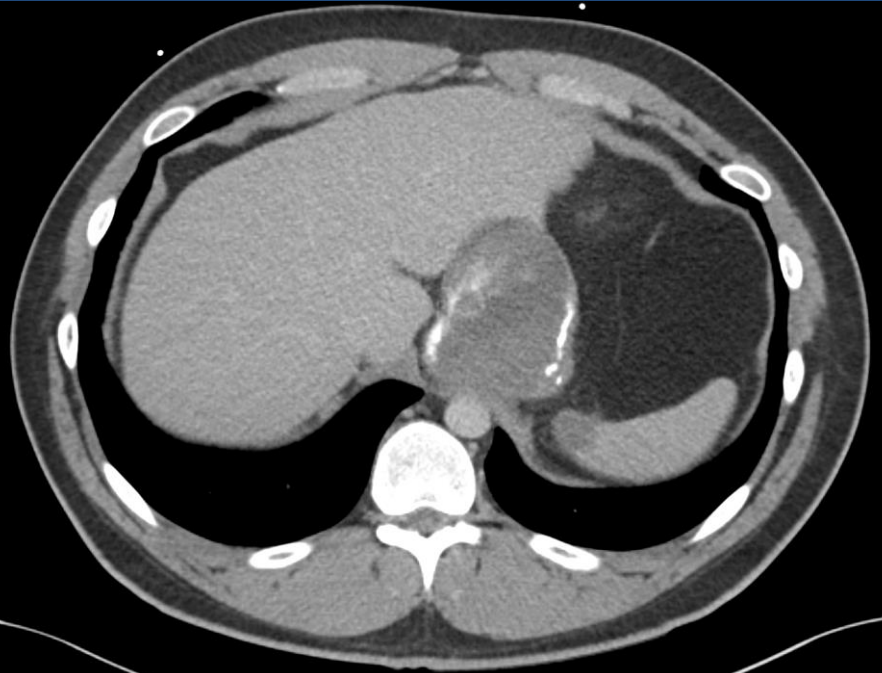


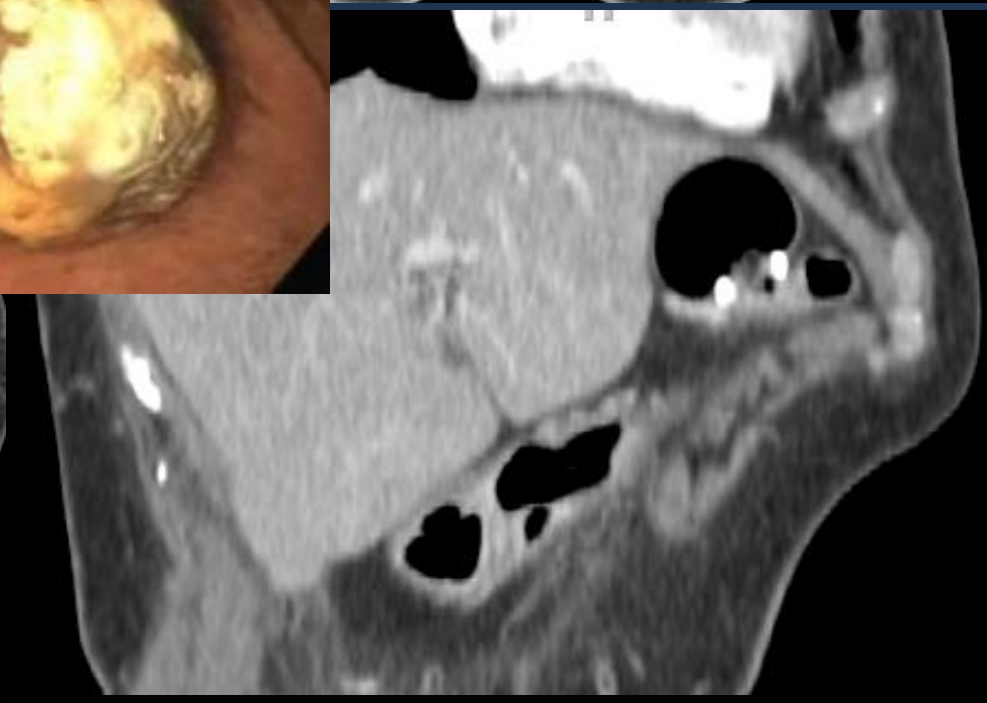
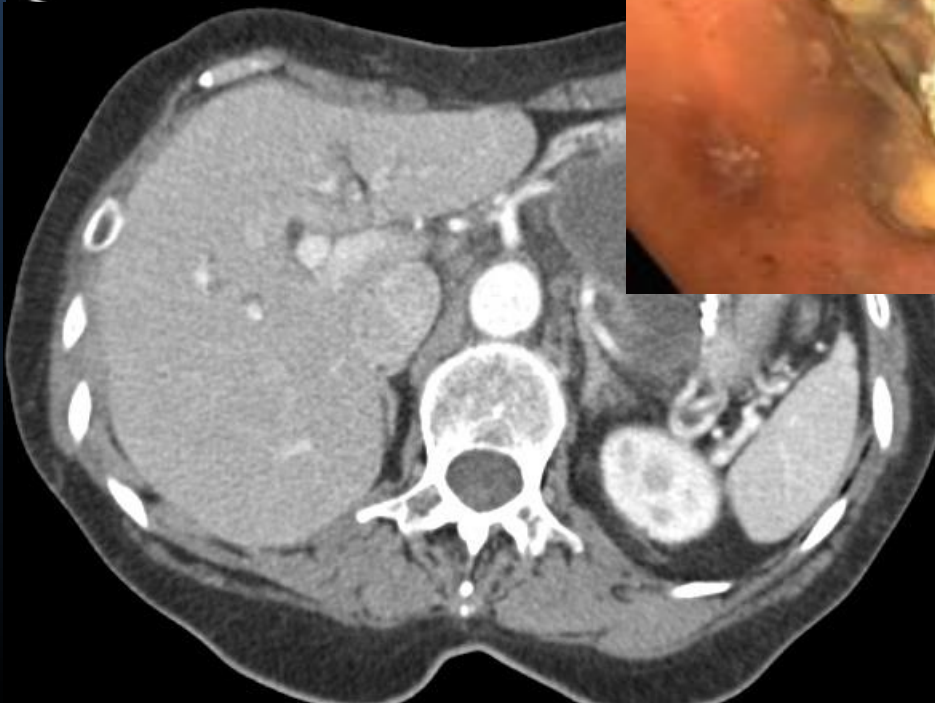
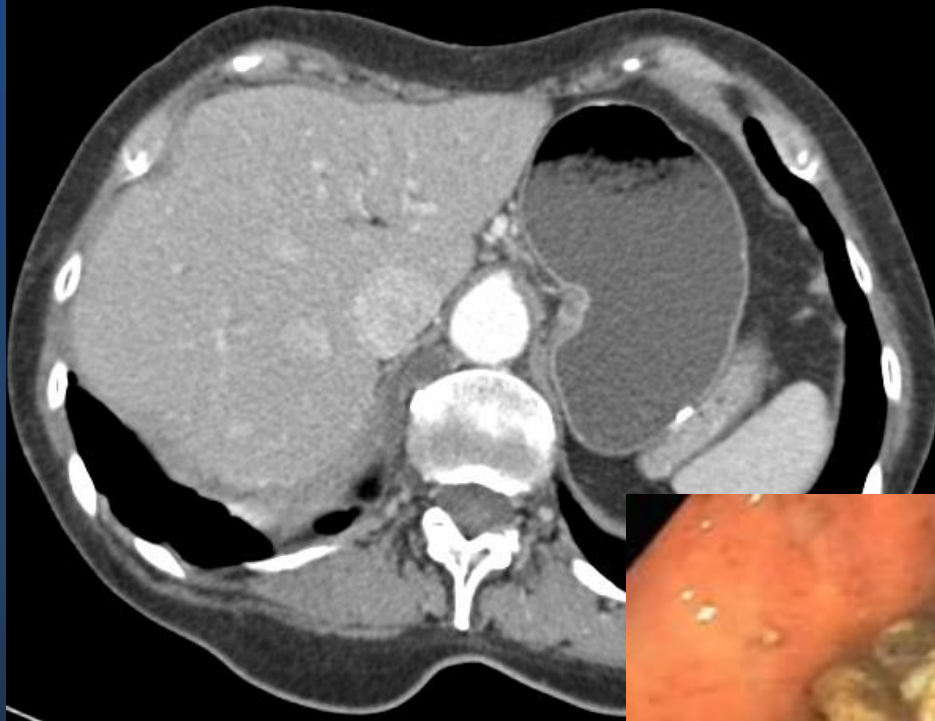


Gastric Inflammation/Infection: Marginal Ulcers

- Occur at the suture line following gastric surgeries
 - Billroth II
 - Roux-en-Y bypass
- Can be deeply penetrating
- Usually begins at the jejunal side of gastrojejunostomy
- Typically develops 2-4 years following surgery

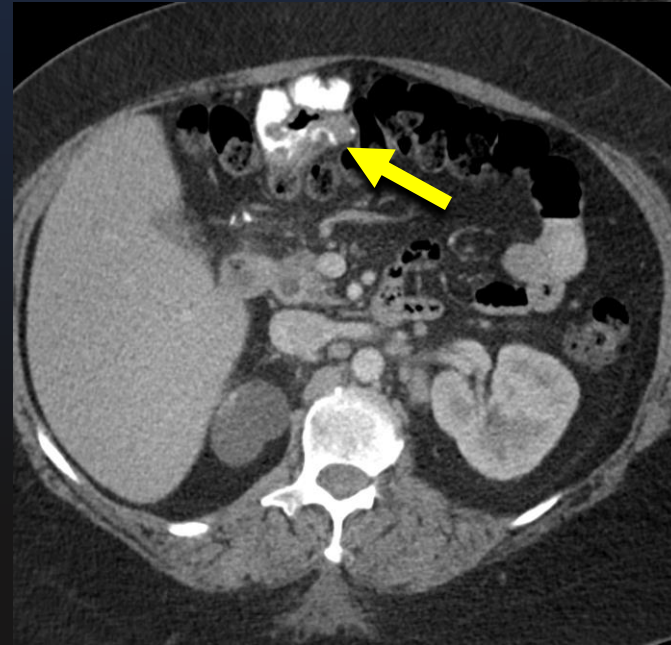
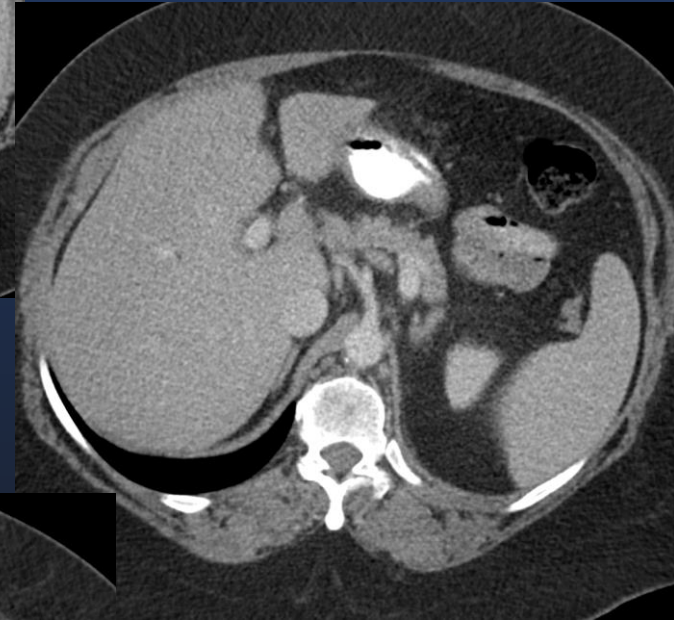
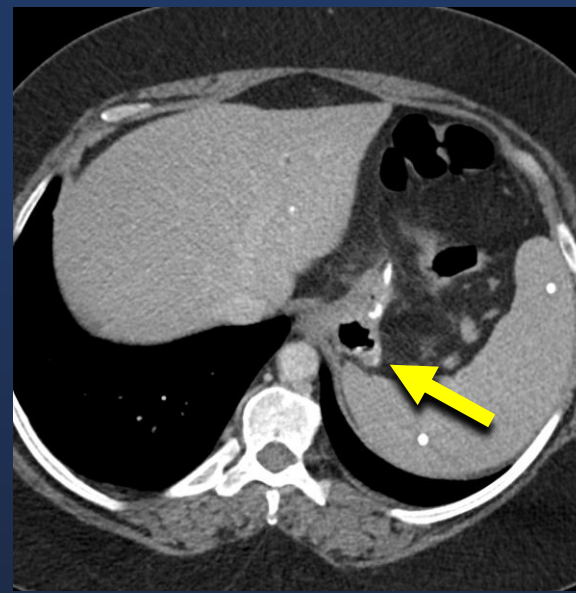


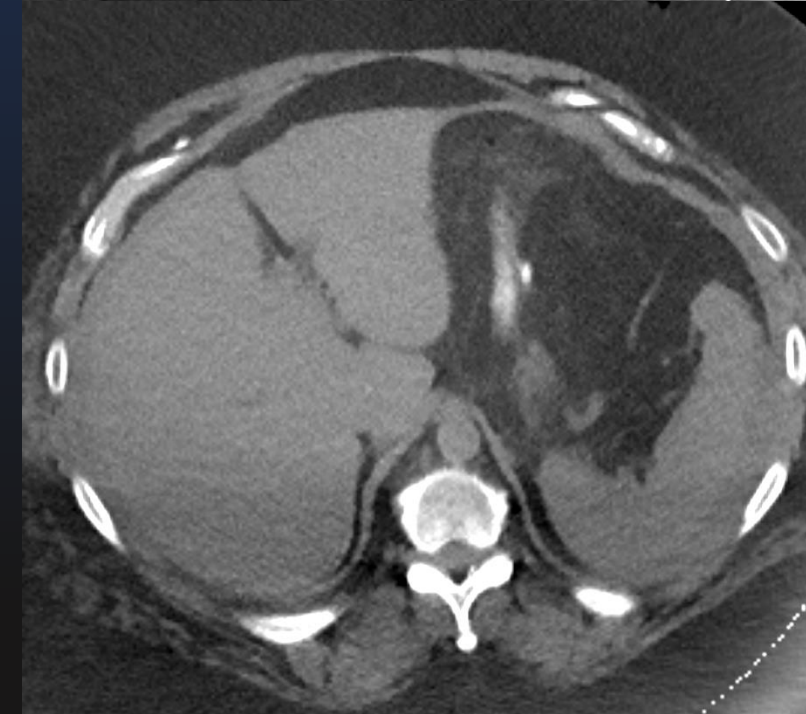
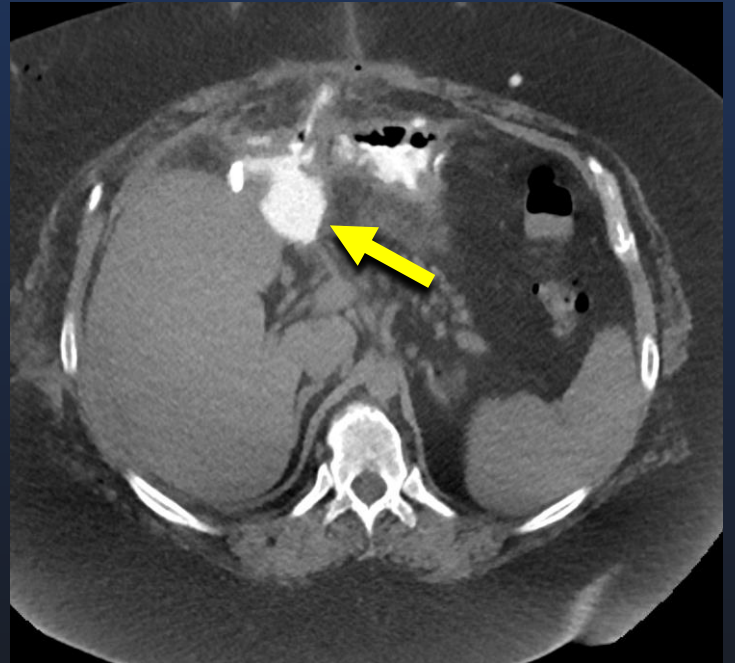
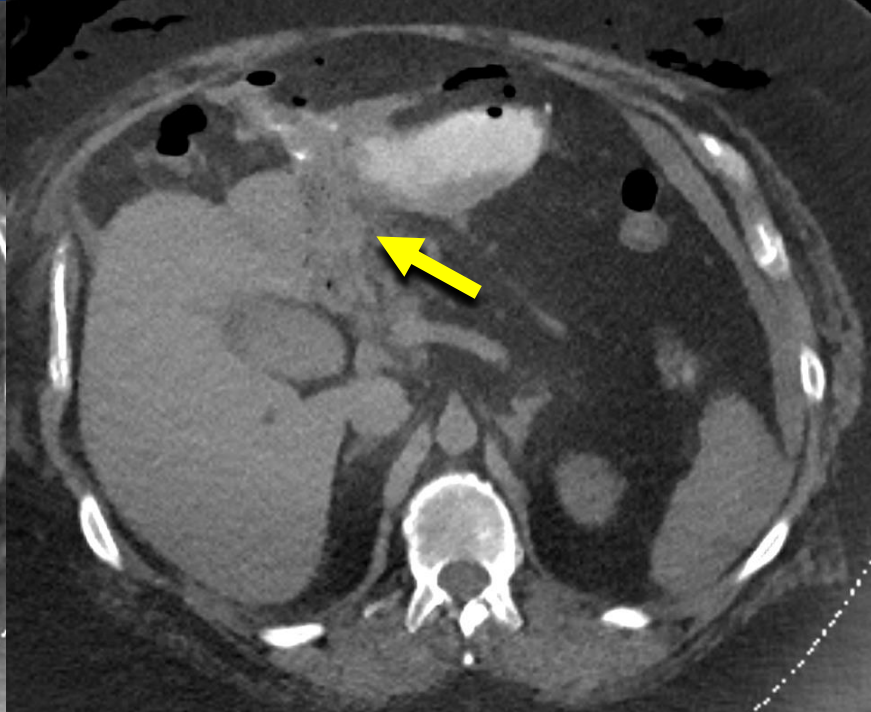
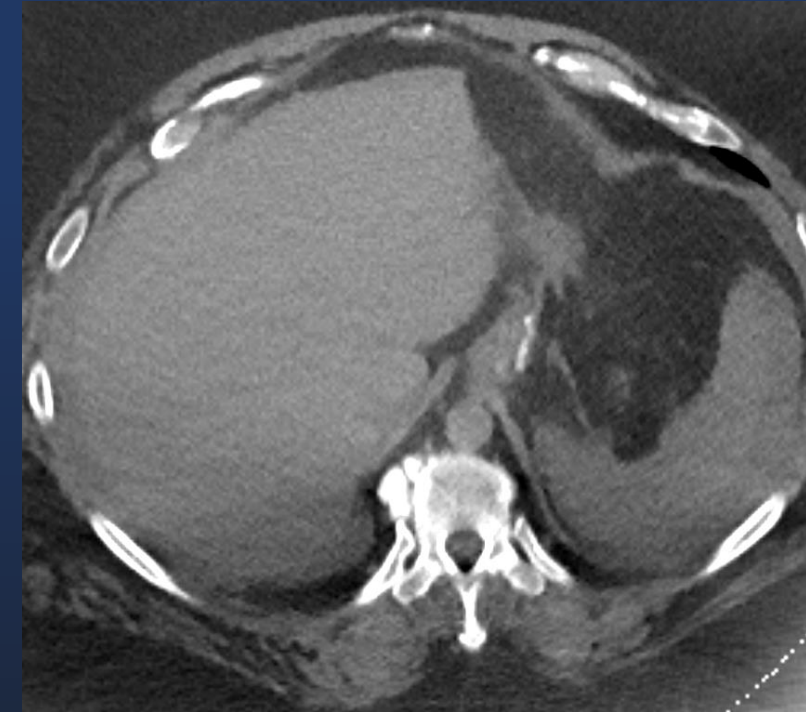


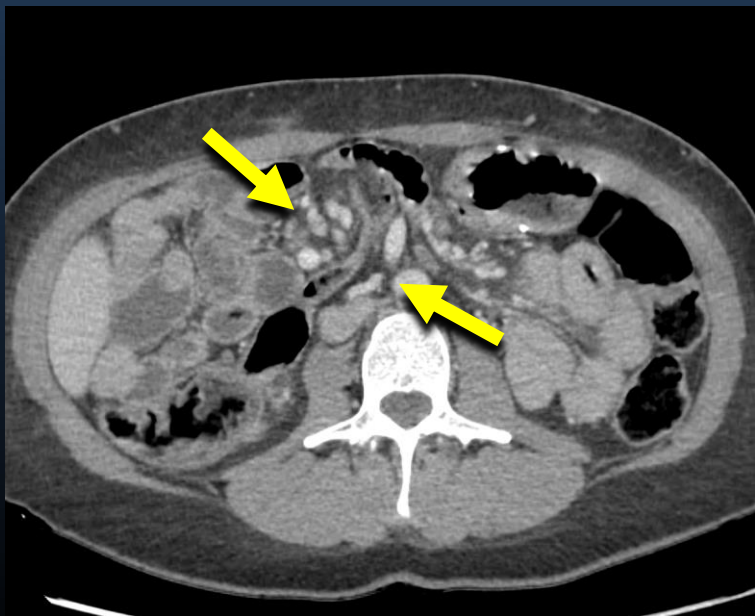


Duodenal Switch

- Combination of gastric sleeve, gastric bypass
- Has similar complications to GS/RYBG
- Most effective weight loss results







Conclusions

- Gastric sleeve – most common. Look out for leak/hemorrhage
- Lap Band – decreasing use. Slippage and erosion can be subtle
- DS/RYGB – anastamotic complications and hernias