

Postoperative Hemoperitoneum

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Patient History

- **38 y.o female POD#2 s/p robotic-assisted left salpingo-oophorectomy, right adnexal cystectomy with extensive lysis of adhesions for bilateral adnexal lesions.**
- Intraoperative frozen section consistent with benign hemorrhagic ovarian cyst and paratubal abscess; final pathology consistent.
- **Medical Hx:** ESRD iso lupus nephritis, receiving peritoneal dialysis at home, Lupus, HTN, and secondary hyperparathyroidism/hyperphosphatemia.
- **Surgical Hx:** None
- **Social Hx:** No alcohol or drug use.
- **Medications:**
 - Lupus: Plaquenil 200 mg daily, CellCept held for 2 wks post-op
 - HTN: Coreg 25 mg BID, Cozaar 100mg daily, Norvasc 5 mg daily
 - Secondary Hyperparathyroidism/Hyperphosphatemia: Rocaltrol 1mg daily

Chief Complaint

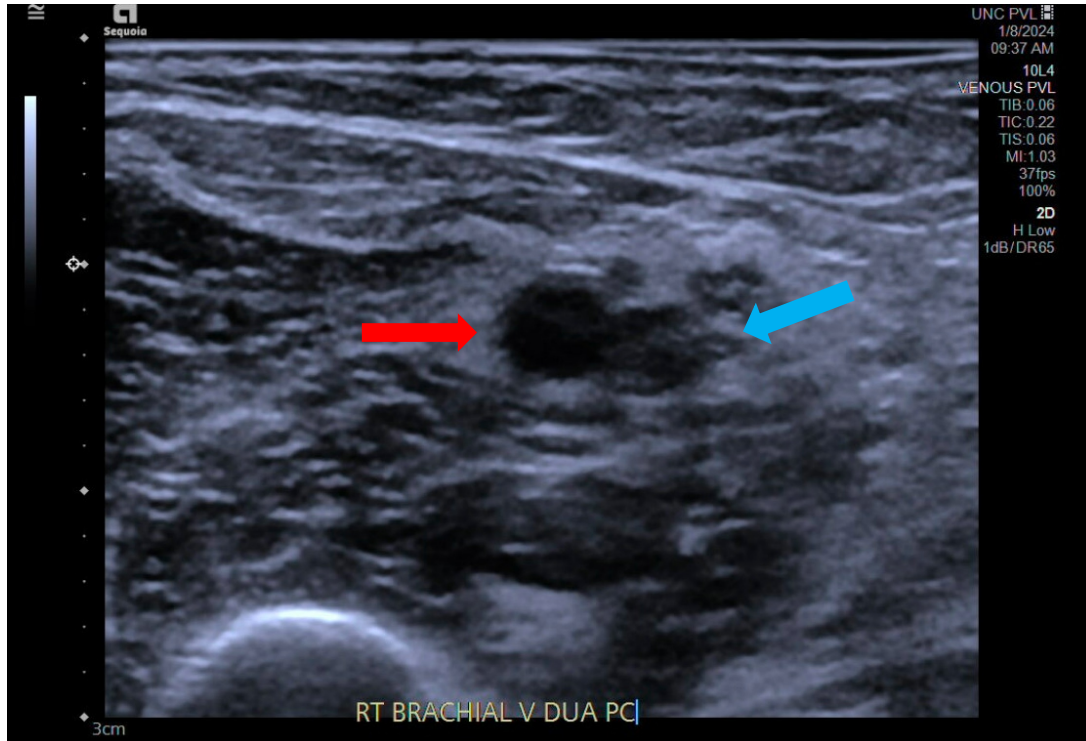
- On POD#2 she developed new onset fatigue and dizziness. Otherwise doing well. Pain well controlled on oral medications. Tolerating a regular diet without nausea or vomiting. Voiding and having bowel movements without issues and ambulating.
- **Vitals:** T: 98 HR: 76 BP: 129/90 RR: 16 SpO2: 100%
- **Exam:** Awake and oriented. RRR. CTABL. Normal WOB. Abdomen soft, appropriately tender to palpation, non-distended with normal bowel sounds. Laparoscopic incisions closed with surgical glue, clean, dry, intact with no surrounding erythema or induration. 4x4 over peritoneal dialysis site, clean and dry.

Differential Diagnosis, Work-up and Inpatient Course

- **Differential diagnosis:** Intraabdominal bleeding, intraabdominal infection, hypovolemia, anemia, medication effect.
- **Labs:** BMP consistent w/ ESRD, CBC w/ Hgb 6.1, Hct 19.8, WBC 12.7
- **Treatment:** 1u pRBC, fluids deferred iso kidney function
- **POD#3:** Developed right upper extremity and right sided neck pain and tingling.
 - *Test yourself Q1: What imaging should we order to rule out DVTs?*

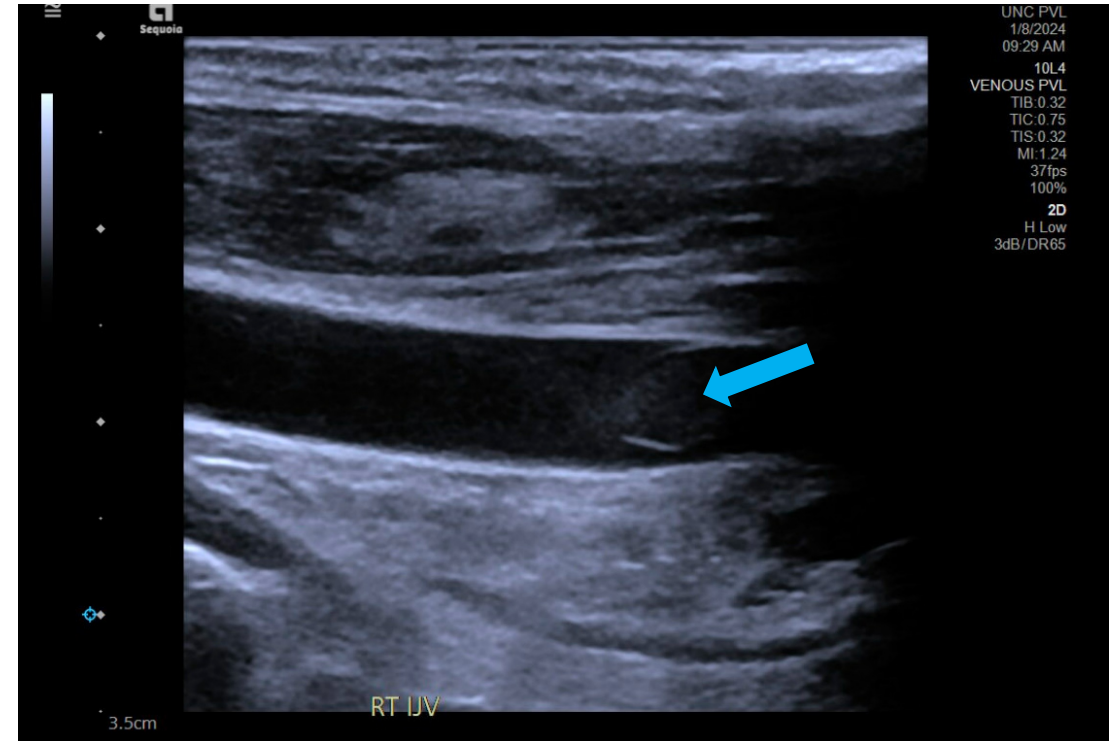
Imaging Studies from PACS

1



Imaging Type: PVL R Upper Ext
View: Short Axis
POD#3

Red Arrow: R Brachial Artery
Blue Arrow: Clot w/n R Brachial Vein



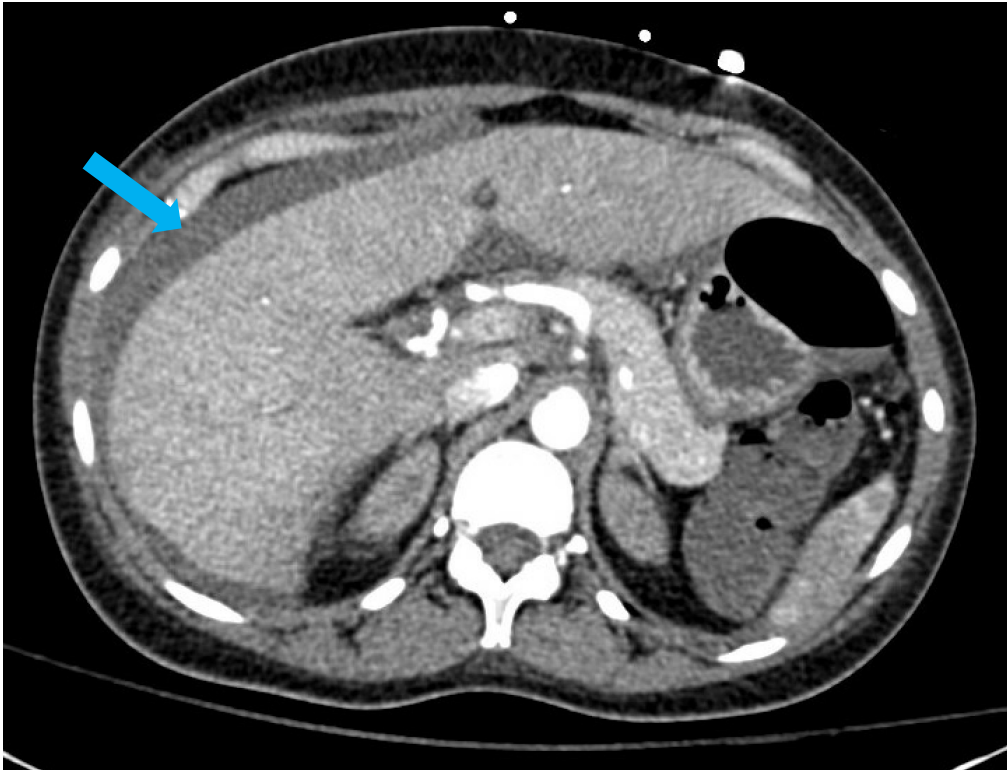
Imaging Type: PVL R Upper Ext
View: Long Axis
POD#3

Blue Arrow: Clot w/n R Internal Jugular Vein

Inpatient Course Continued...

- **Imaging findings:** R Brachial Vein DVT and R IJ Vein DVT.
- **Treatment:** Started on therapeutic heparin in setting of newly diagnosed venous thrombosis on POD#3 following development of right upper extremity and right sided neck pain and tingling.
- **POD#5:** Developed worsening lightheadedness, fatigue, shortness of breath, and abdominal pain. Found to be hypotensive to 80's/50's with HR in 110's. Hgb 6.1. Fast exam w/ possible fluid collection in lower pelvis c/f bleeding likely worsened by the start of Heparin. IV infiltrated and rapid response called.
 - *Test yourself Q2: What imaging should we order to rule out intraabdominal bleeding?*

Imaging Studies from PACS 2



Imaging Type: CTAP w/o Contrast
View: Axial
POD#5

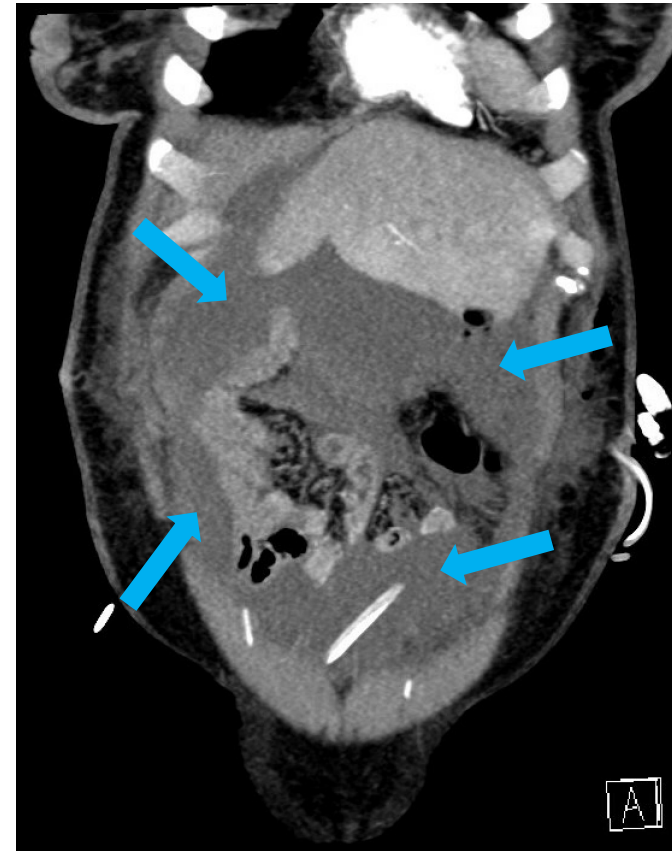
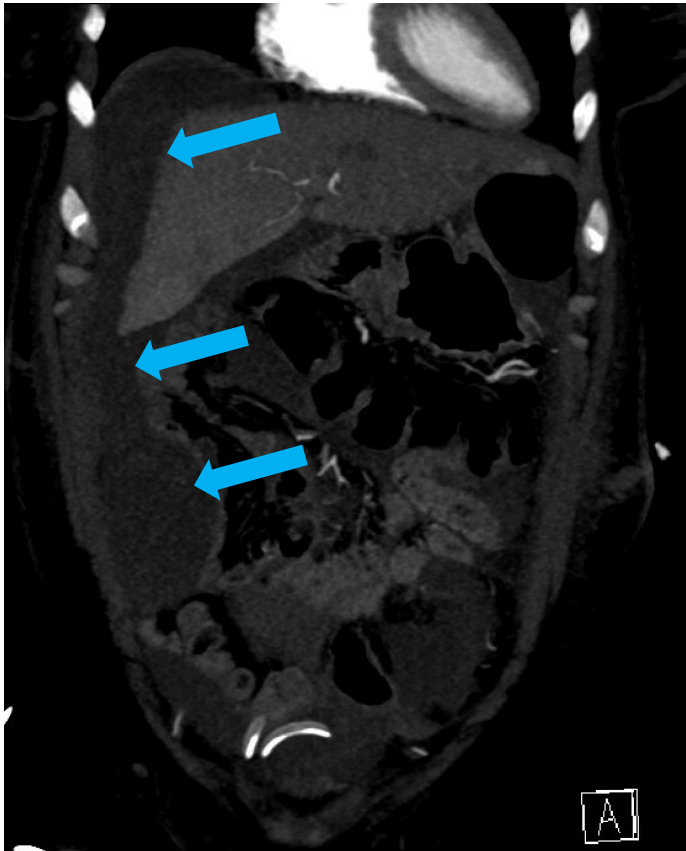
Blue Arrow: Fluid Surrounding Liver



Imaging Type: CTAP w/o Contrast
View: Axial
POD#5

Blue Arrow: Fluid in RLQ

Imaging Studies from PACS 3 (Same study)



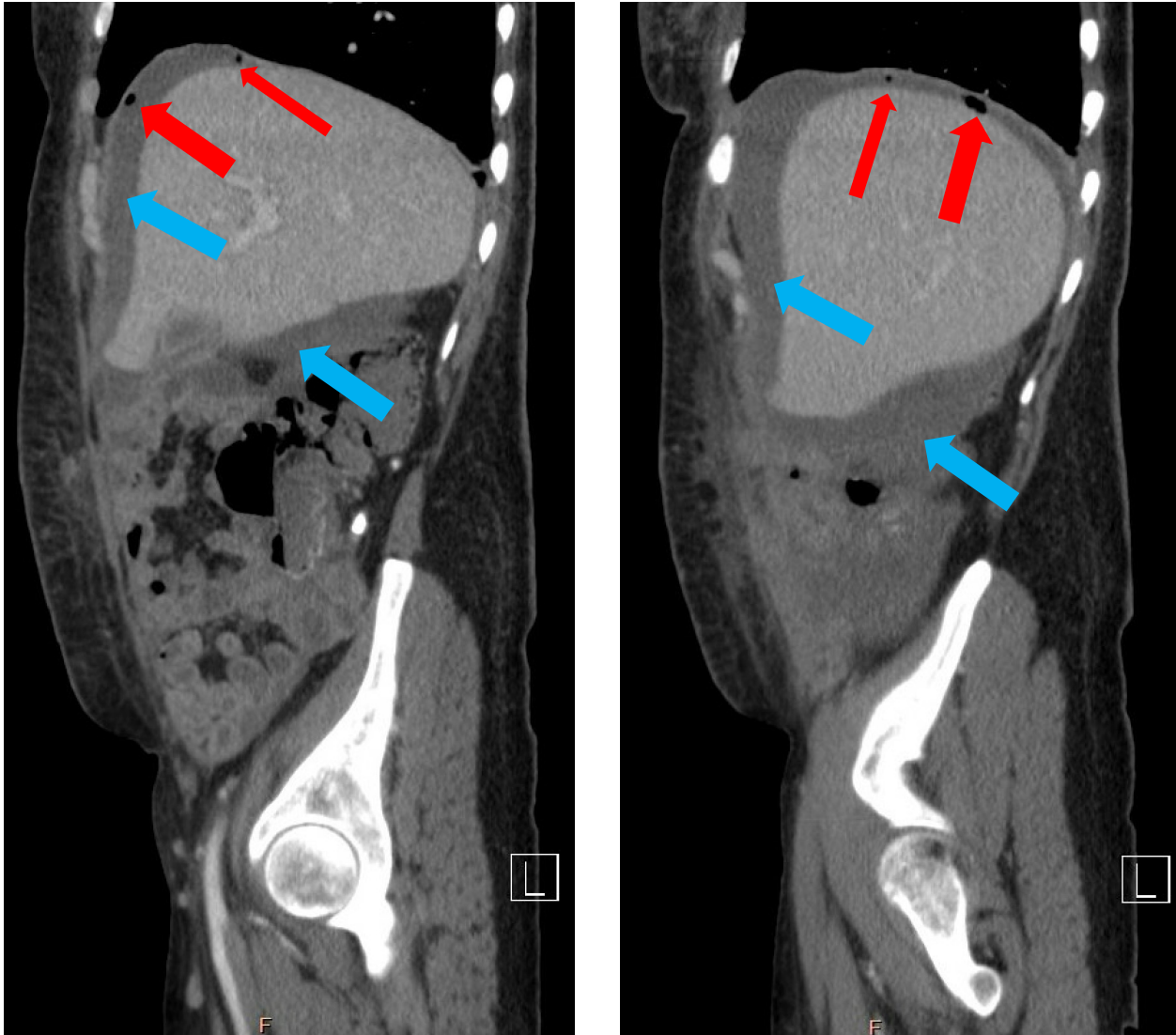
Imaging Type: CTAP w/o Contrast
View: Coronal
POD#5

Blue Arrows: Hemoperitoneum

Inpatient Course Continued...

- **POD#5:** Following CTAP findings, taken emergently back to the OR for diagnostic laparoscopy and laparoscopic abdominal washout for intra-abdominal bleeding. 1.5L of blood and clot removed requiring 3u pRBC for intraoperative hemoglobin 6.0 and hypotension. Anticoagulation held.
- **POD#6/POD#1:** Additional 2u pRBCs for Hgb drop to 6.6 and newly developed fevers.
 - *Test yourself Q3: What imaging should we order to rule out overlying infection in the abdomen?*

Imaging Studies from PACS 4



Imaging Type: CTAP w/o Contrast
View: Sagittal
POD#6

Blue Arrows: Hemoperitoneum
Red Arrows: Bubble lucencies

Inpatient Course Continued...

- **Imaging findings:** Superimposed intra-abdominal infection with reaccumulation of pelvic hemoperitoneum and bubbly lucencies c/f pneumoperitoneum.
- **Treatment:** Started on broad spectrum antibiotics, but no additional interventions for hemoperitoneum given stable Hgb and stable BP and HR.
- **POD#12:** Fevers resolved. Hgb stable. Discharged on oral antibiotics for 2 wks.
- **Readmitted soon after for sepsis and continued active bleeding, but is now doing well. **

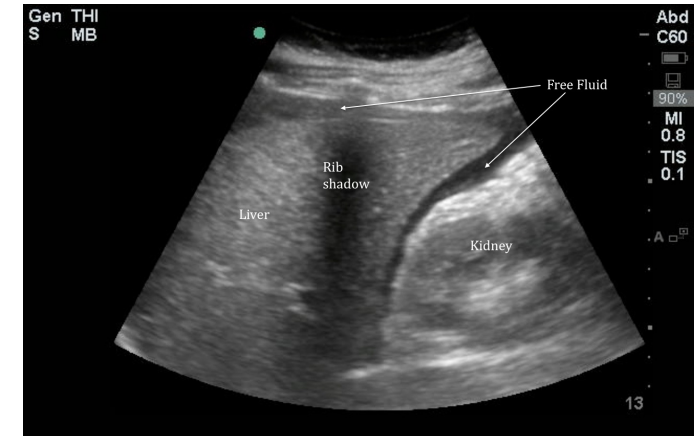
What imaging do I order if I have concern for hemoperitoneum?

- US
 - Cost ^[6]
 - Insurance: \$10-\$50
 - W/o Insurance: \$174-\$291
 - Radiation: 0
 - Fast Exam: Moderate Sensitivity (82%); High Specificity (99%) ^[1]
 - Non-specific, helps make quick determination for conservative vs OR management. Good in emergent situations and unstable patients.
- CT A/P
 - Cost ^[6]
 - Insurance: \$312-\$840
 - W/o Insurance: \$300-thousands
 - Radiation: 10 mSv, ~3 yrs of natural radiation
 - Sensitivity: 90% and Specificity: 94% ^[2]
 - Accurate, but costly and takes time. Not ideal in unstable patients.
- MRI
 - Cost ^[6]
 - Insurance: \$380-\$1,326
 - W/o Insurance: Thousands, can be as high as \$12K
 - Radiation: 0
 - Sensitivity and Specificity: 100% ^[2]
 - Accurate, but very expensive. Rarely used given the price and time and access to other imaging studies as above.

What will I see on imaging?

- Ultrasound

- Non-specific appearance of fluid
 - Clots can be hyperechoic
 - Free fluid generally anechoic (black)
- Fluid-fluid levels may be seen and have mixed internal echogenicity ^[4]
 - Fluid-fluid levels: separation of two fluids of differing densities w/n a cavernous space



- CT

- To determine what the fluid is (ascites, blood, bowel contents, etc), you must determine the density of the fluid ^[7]:
 - acute bleed: 30-45 HU (Hounsfield units)
 - clotted blood: 45-70 HU
 - old blood products: <30 HU
- Blood can be homogeneous or heterogeneous +/- internal linear/nodular hyperdensities; fluid-fluid levels are often present. ^[5]

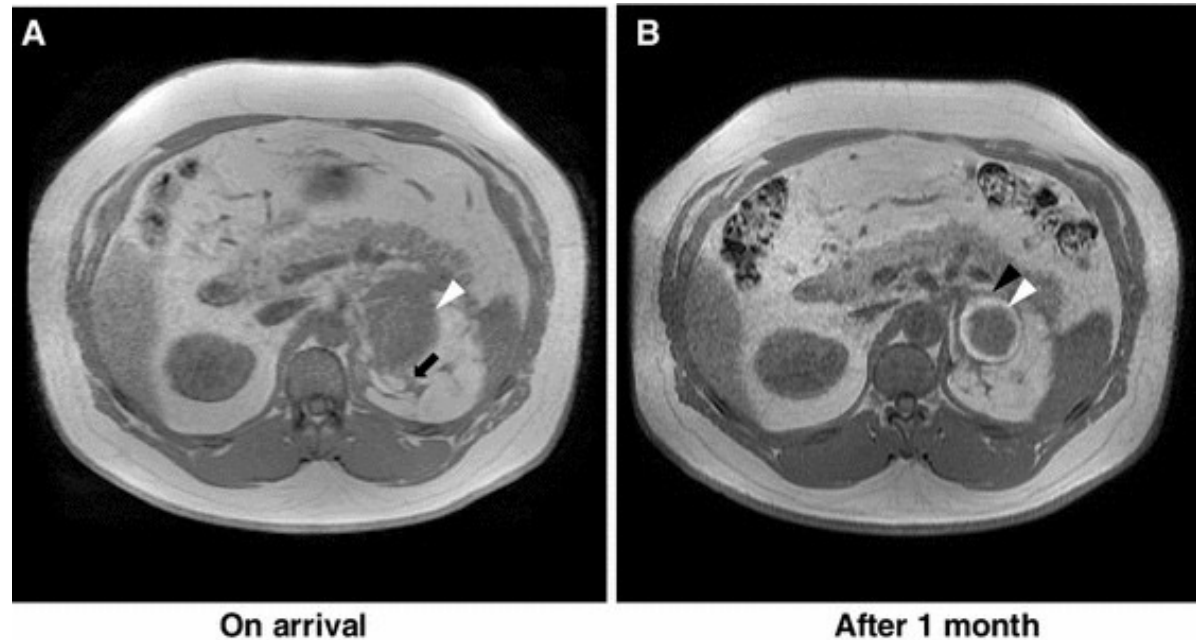


- MRI

- acute (<48 hours) hemoperitoneum is non-specific ^[5]
- subacute (>3 weeks) may see concentric ring sign ^[5]

“Signs” of Hemoperitoneum

- No consistent signs on imaging seen with acute hemoperitoneum as it is dependent on mechanism of injury and the source of bleeding
- Concentric Ring Sign
 - Sign of chronic hematoma on MRI
 - Thin, dark peripheral rim and a bright inner ring most distinctive on T1-weighted images. [8]



Test Yourself!

- *Test yourself Q1: What imaging should we order to rule out DVTs?*
 - *Duplex Ultrasound (PVLs)*
- *Test yourself Q2: What imaging should we order to rule out intraabdominal bleeding?*
 - *CT scan (CTAP), can also order CTA*
- *Test yourself Q3: What imaging should we order to rule out overlying infection?*
 - *CT scan (CTAP)*

Wrap Up

- If its an emergency or a patient is unstable and you have concern for bleeding, get a FAST ultrasound.
- If the patient is stable, you can get a CT AP or CT Angiography to determine source of bleeding.
- You can use a CT scan to determine if a patient has an intra-abdominal infection.

References

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