

# Endovascular Coiling – Acute Hemorrhage Diagnosis and Management

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## Focused patient history and workup

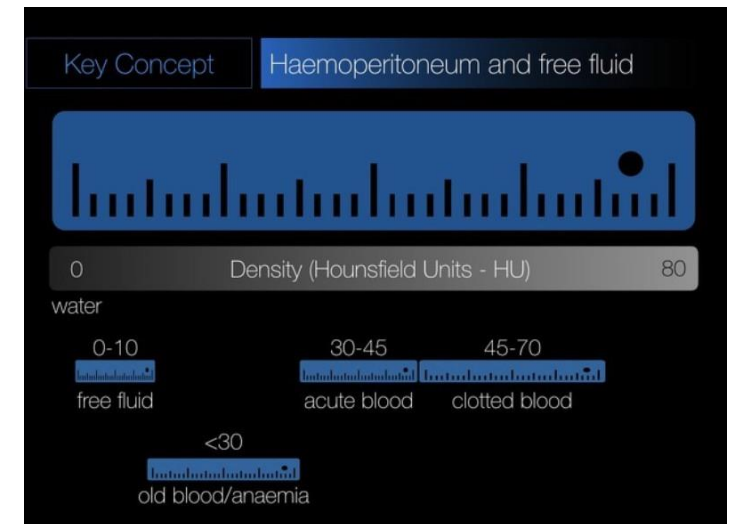
69 y.o. female with HTN and signet ring carcinoma of TI/cecal junction s/p laparoscopic partial colectomy with acute hypotension and tachycardia this morning.

CBC shows a hemoglobin drop from 8.0 to 6.7. She was given a liter bolus and 2U of pRBC were ordered. Transient response to fluid, but subsequently became hypotensive. Patient transferred to ICU and required pressor therapy for hypotension refractory to crystalloid boluses.

CT A/P with IV contrast was obtained...

# Which Examinations? Choice

- Ultrasound
  - Non-specific appearance of intraperitoneal free fluid
  - May not get adequate characterization
- MRI
  - Non-specific signal characteristics for acute hemorrhage
    - Sensitive for blood but varying age of blood results in different appearances due to state of hemoglobin (oxy-, deoxy-, met)
  - Takes longer so limited use in emergent settings
- CT
  - Different densities based on age of blood
    - Recent hemorrhage = 30-45 HU
    - Clotted blood = 45-70 HU
    - Old blood products/anemic blood = <30 HU



# CT exam - Choice

**American College of Radiology  
ACR Appropriateness Criteria®  
Suspected Retroperitoneal Bleed**

Relative Radiation Level Designations		
Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
○	0 mSv	0 mSv
☼	<0.1 mSv	<0.03 mSv
☼☼	0.1-1 mSv	0.03-0.3 mSv
☼☼☼	1-10 mSv	0.3-3 mSv
☼☼☼☼	10-30 mSv	3-10 mSv
☼☼☼☼☼	30-100 mSv	10-30 mSv

**Variant 1: Clinically suspected retroperitoneal bleed. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☼☼☼
CT abdomen and pelvis without and with IV contrast	Usually Appropriate	☼☼☼☼
CTA abdomen and pelvis with IV contrast	Usually Appropriate	☼☼☼☼☼
Aortography abdomen and pelvis	May Be Appropriate (Disagreement)	☼☼☼☼☼
CT abdomen and pelvis without IV contrast	May Be Appropriate	☼☼☼
US abdomen and pelvis	Usually Not Appropriate	○
Radiography abdomen and pelvis	Usually Not Appropriate	☼☼☼
MRA abdomen and pelvis with IV contrast	Usually Not Appropriate	○
MRA abdomen and pelvis without and with IV contrast	Usually Not Appropriate	○
MRA abdomen and pelvis without IV contrast	Usually Not Appropriate	○
MRI abdomen and pelvis without and with IV contrast	Usually Not Appropriate	○
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	○
RBC scan abdomen and pelvis	Usually Not Appropriate	☼☼☼

CT A/P w contrast appropriate for this patient with suspected abdominal bleed

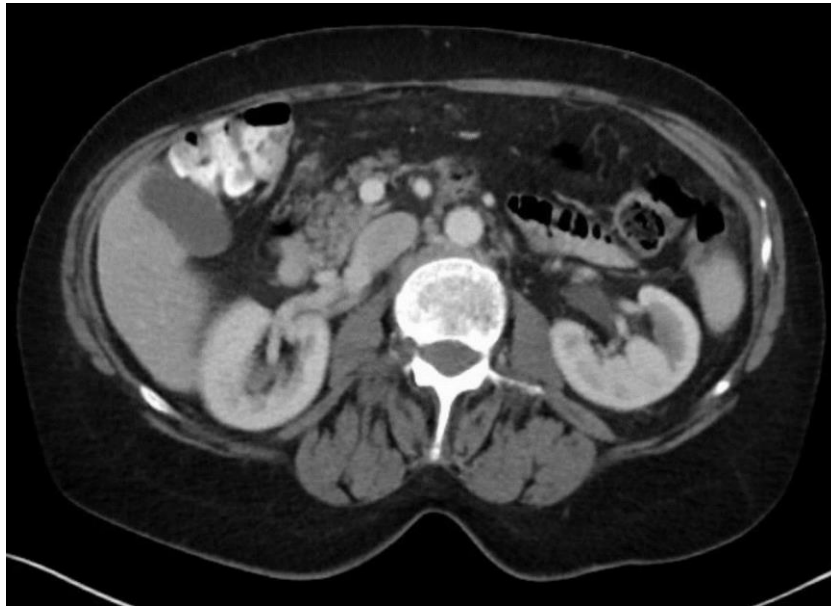
Speed and ability to identify bleeding + extravasation

No contraindications to contrast ie no anaphylaxis or renal impairment

# CT Exam - Statistics

	CT A/P w/ IV contrast	CTA A/P w/ IV contrast
Sensitivity	79%	92.4%
Specificity	92.1%	99.5%
Radiation Exposure	7.7 mSv	8.7 mSv
Cost	\$550 - \$1,400	\$1,150 - \$2,925

A CT examination was ordered . . .



Baseline image from 1 year prior

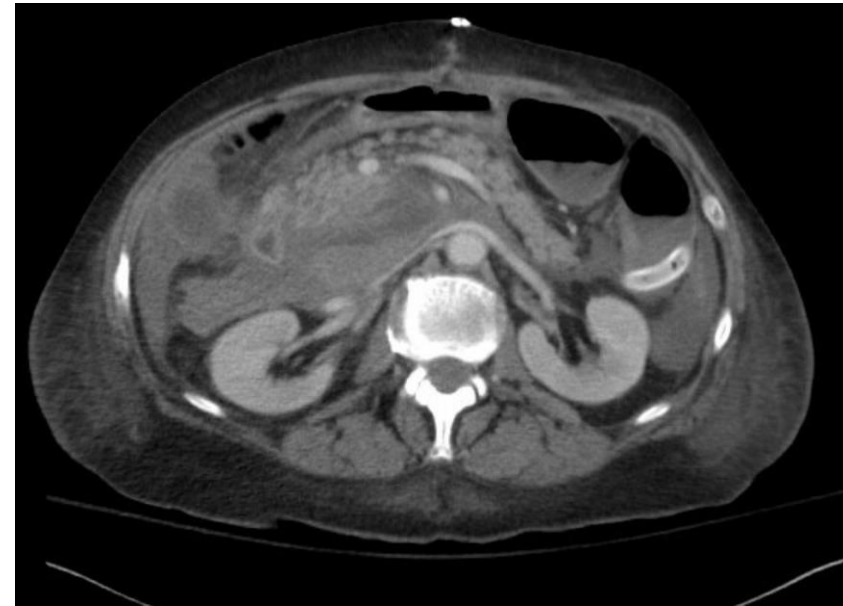
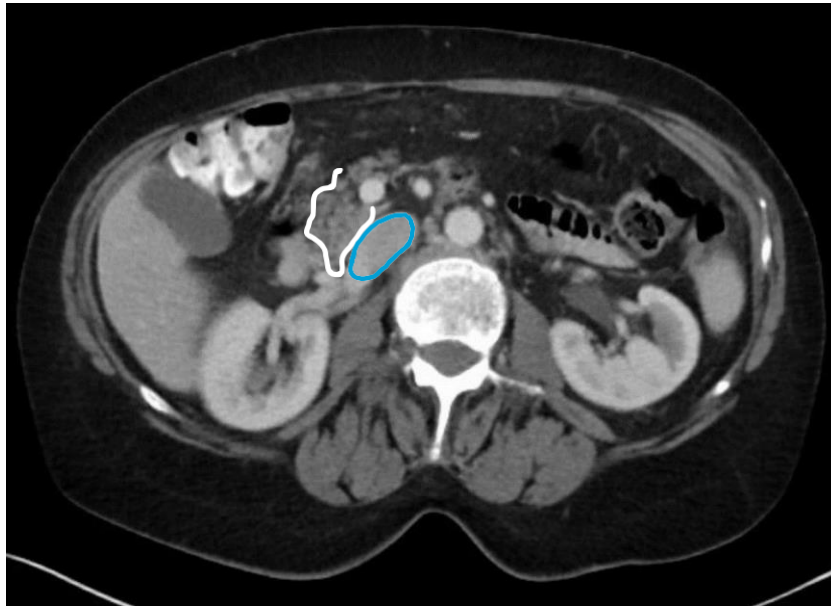


Image from admission

CT examination was ordered . . .



Baseline image from 1 year prior

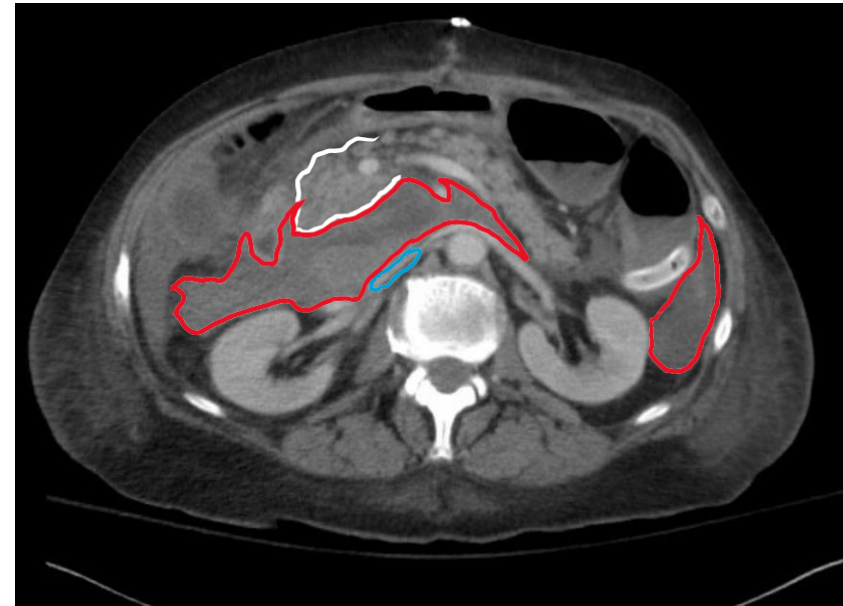
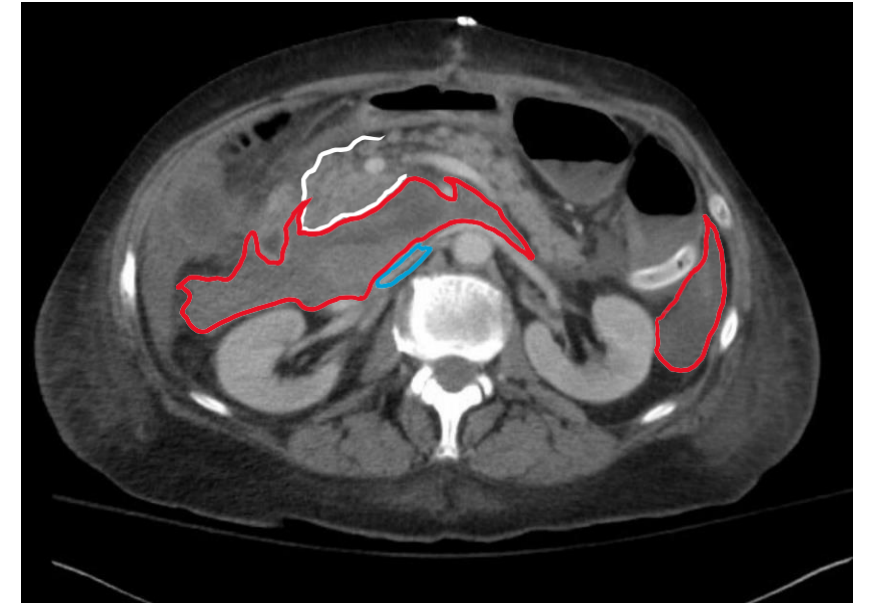
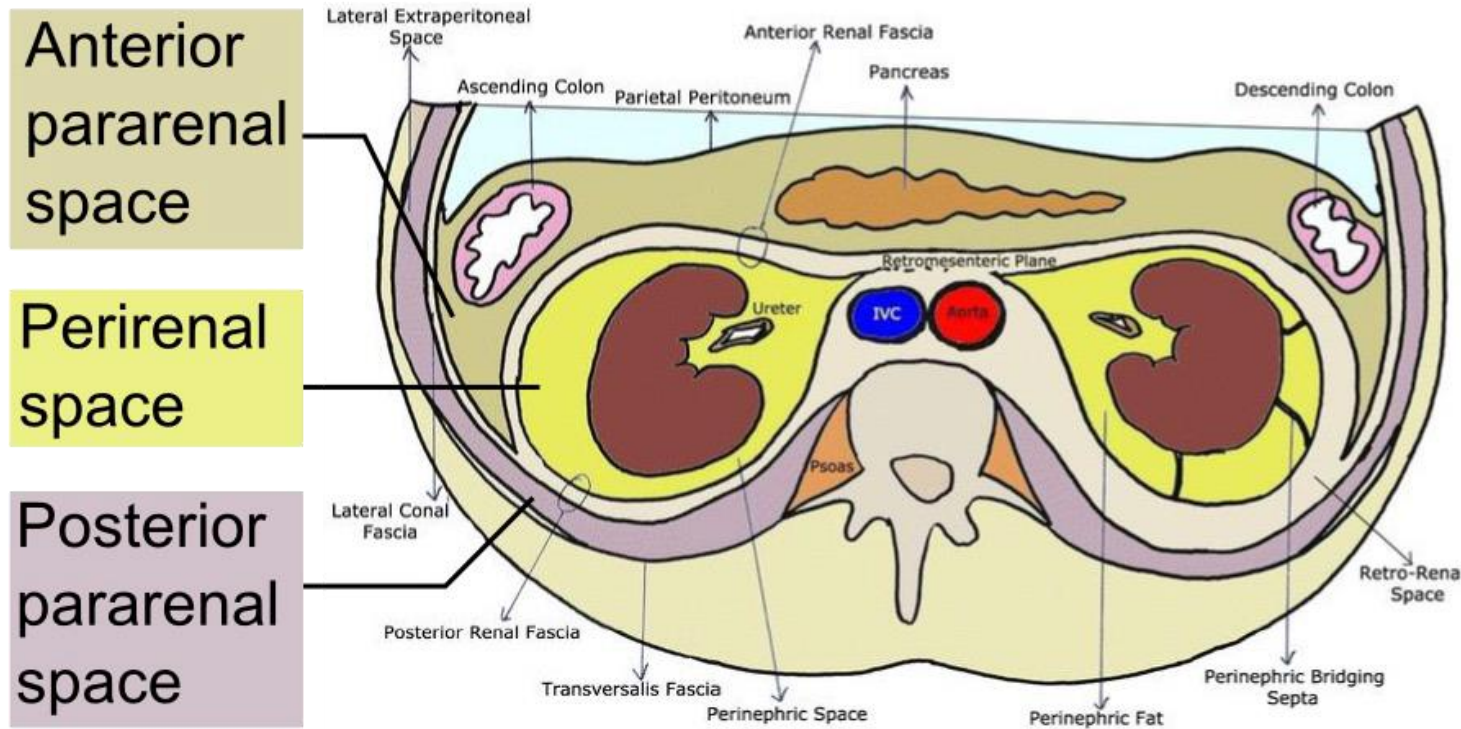


Image from admission

# Imaging studies from PACS





# Imaging studies from PACS



Baseline image from 1 year prior

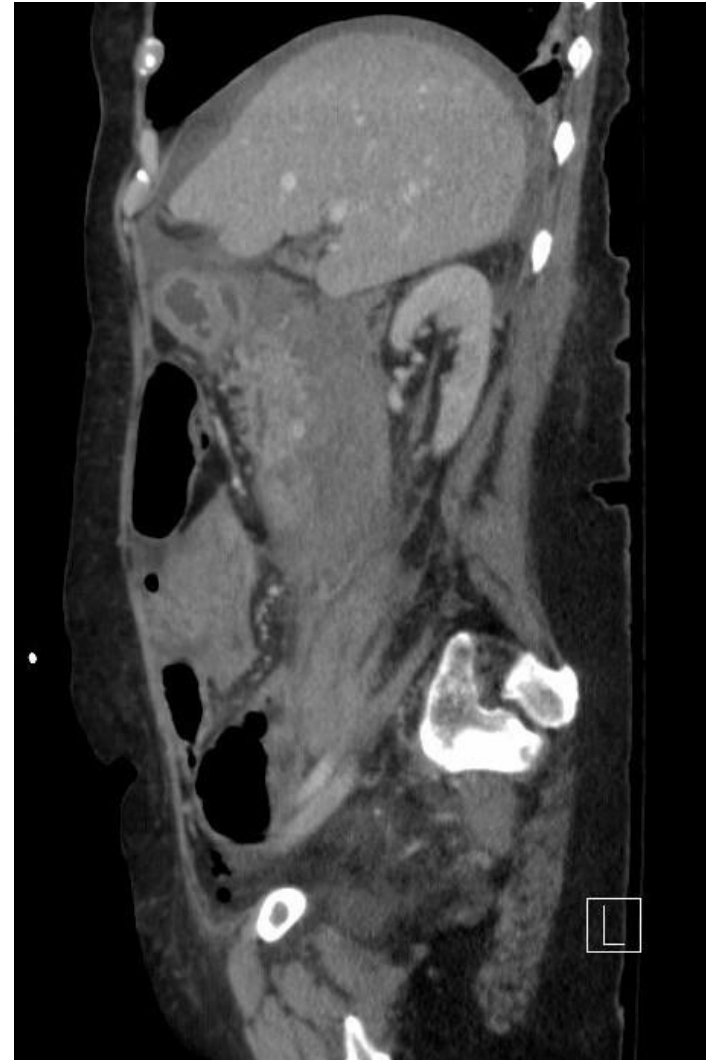
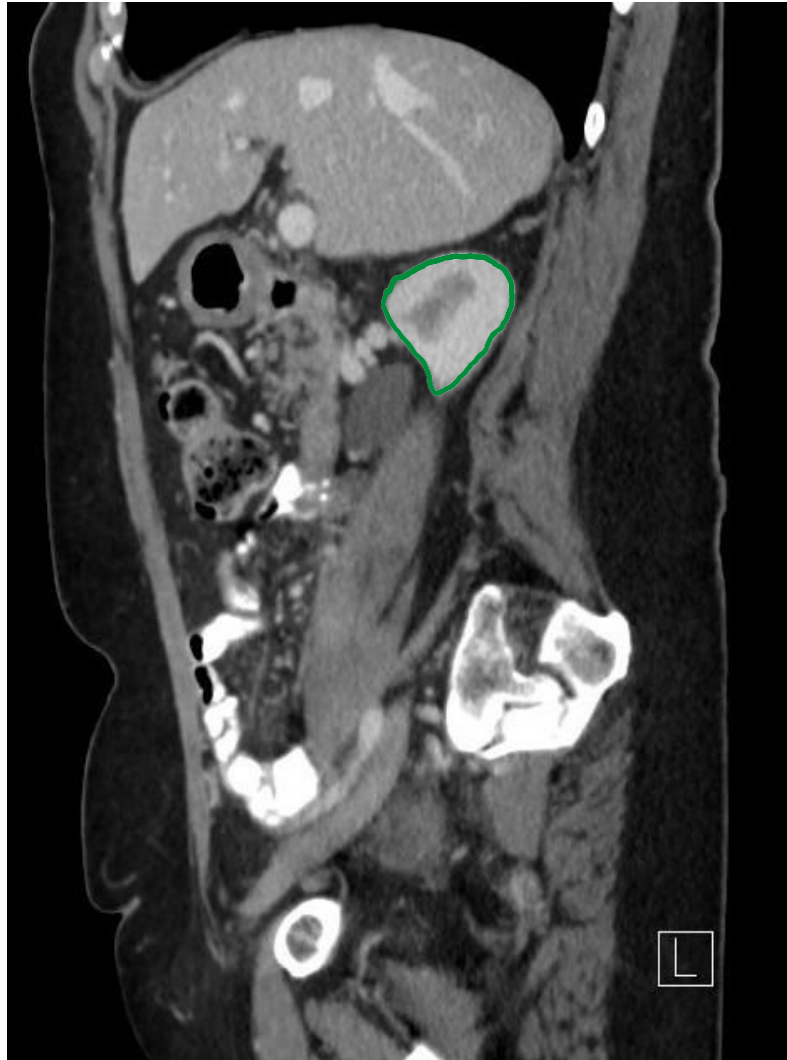


Image from admission

# Imaging studies from PACS



Baseline image from 1 year prior

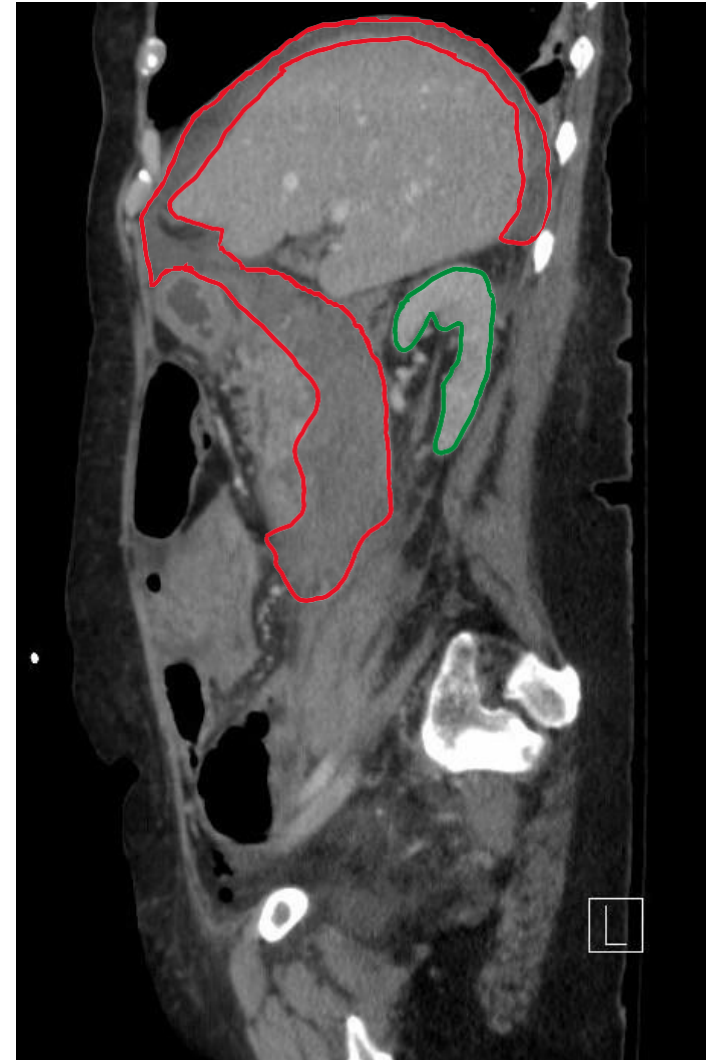


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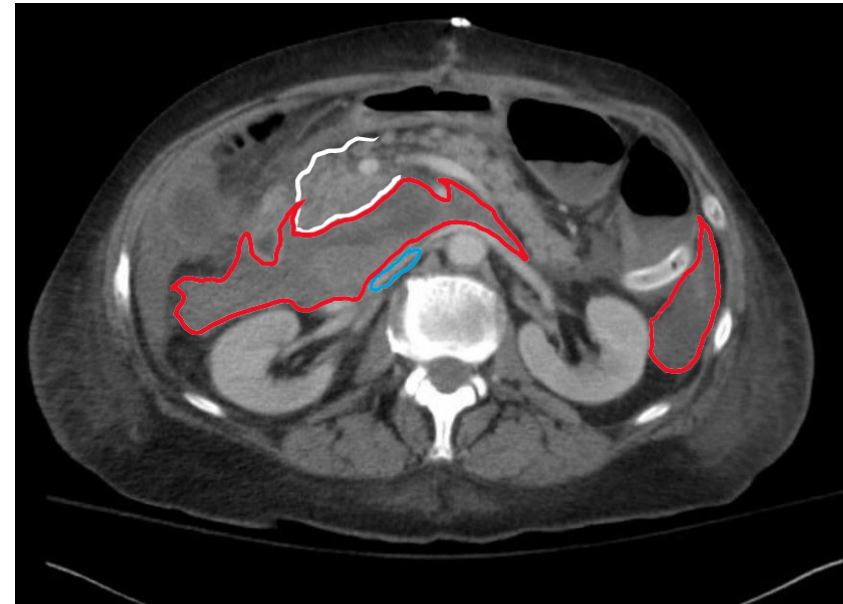
# Imaging studies from PACS

## FINDINGS:

“... High density hemoperitoneum is present. There is also large volume high density fluid within the anterior pararenal space and retroperitoneum, displacing the pancreas anteriorly ...”

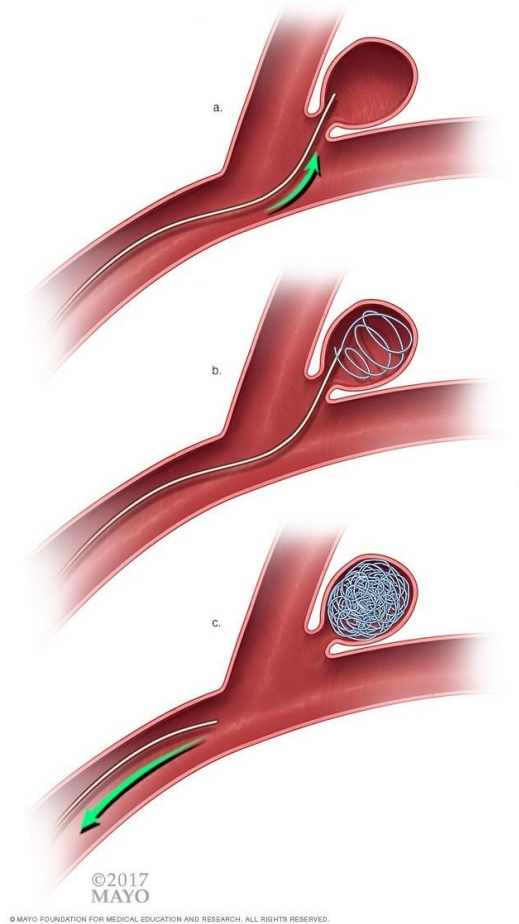
## IMPRESSION:

“Large volume hemoperitoneum and hemoretroperitoneal, most prominent in the anterior pararenal space likely secondary to bleeding peripancreatic pseudoaneurysm. Anterior pararenal space blood compresses the infrahepatic IVC.”



# Patient treatment

- Pseudoaneurysms are increasingly being treated with endovascular coiling in patients such as these who have unidentified bleeding and need bleeding control emergently
  - Especially useful for poor surgical candidates
- IR was consulted for mesenteric angiography followed by endovascular coiling if a culprit pseudoaneurysm was identified

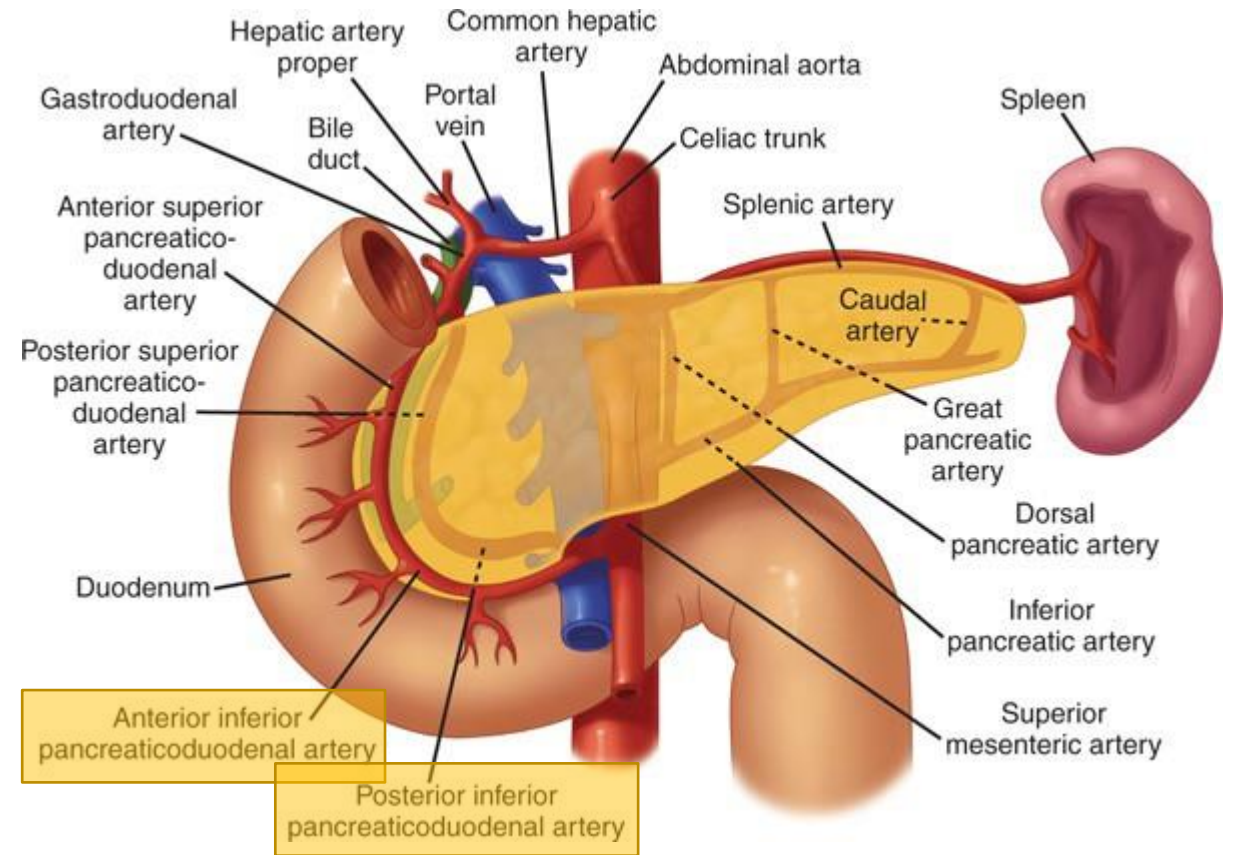


# Patient treatment

Superior Mesenteric Artery (SMA)



Pancreaticoduodenal branches of SMA



## Patient treatment or outcome 2



Sub-selected anterior-inferior pancreaticoduodenal branch with active extravasation



Subsequent coiling of the anterior-inferior and posterior-inferior (not previously shown) pancreaticoduodenal branches

## Top Three Test Yourself Q's

1. Which imaging modality (US, XR, CT, MRI, etc.) is most appropriate in a hemodynamically stable patient with concern for acute hemorrhage?
2. What procedure can be done in poor surgical candidates with unlocalized bleeding as a diagnostic and therapeutic intervention?
3. Which state of blood appears most dense on CT (old, new, clotted)?

## Top Three Test Yourself Q's

1. Which imaging modality (US, XR, CT, MRI, etc.) is most appropriate in a hemodynamically stable patient with concern for acute hemorrhage? **CT**
2. What procedure can be done in poor surgical candidates with unlocalized bleeding as a diagnostic and therapeutic intervention?  
**Angiography with endovascular coiling**
3. Which state of blood appears most dense on CT (old, new, clotted)?  
**Clotted**



# References

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2. Chatzaraki V, Thali MJ, Ampanozi G. Diagnostic accuracy of postmortem computed tomography for bleeding source determination in cases with hemoperitoneum. *Int J Legal Med*. 2021 Mar;135(2):593-603. doi: 10.1007/s00414-020-02472-0. Epub 2021 Jan 7. PMID: 33410928; PMCID: PMC7870604.
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