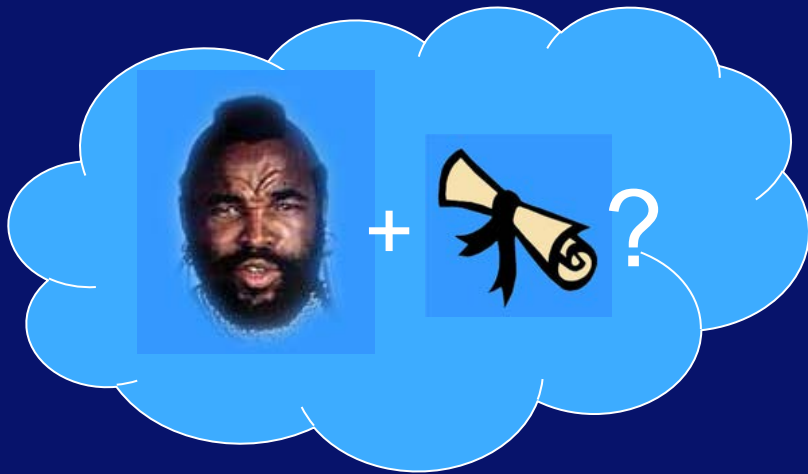


Introduction to Abdominal Imaging

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And I'm Dr. T.

I'm Dr. M. Welcome to Abdominal Imaging 101!



Lecture Outline

- Objectives
- Relevance of material
- Imaging modalities
- Clinical Approach to Abdominal Anatomy
 - 4 Quadrants
 - Retroperitoneal
- Summary

Objectives

- Learn the basic modalities for imaging the abdomen
- Learn the organs found in each of the four abdominal quadrants
- Learn retroperitoneal organs
- Exposure to the presentation of common abdominal pathologies

Relevance

- Clinical use
 - 5% of visits to the ER are for abdominal pain
 - 1/8 ER patients get a CT scan
- Radiologist or Consulting With One
- USMLE Step 1
 - Some questions use radiology
- Gross anatomy exam

What are the 4 imaging modalities commonly utilized for the abdomen?

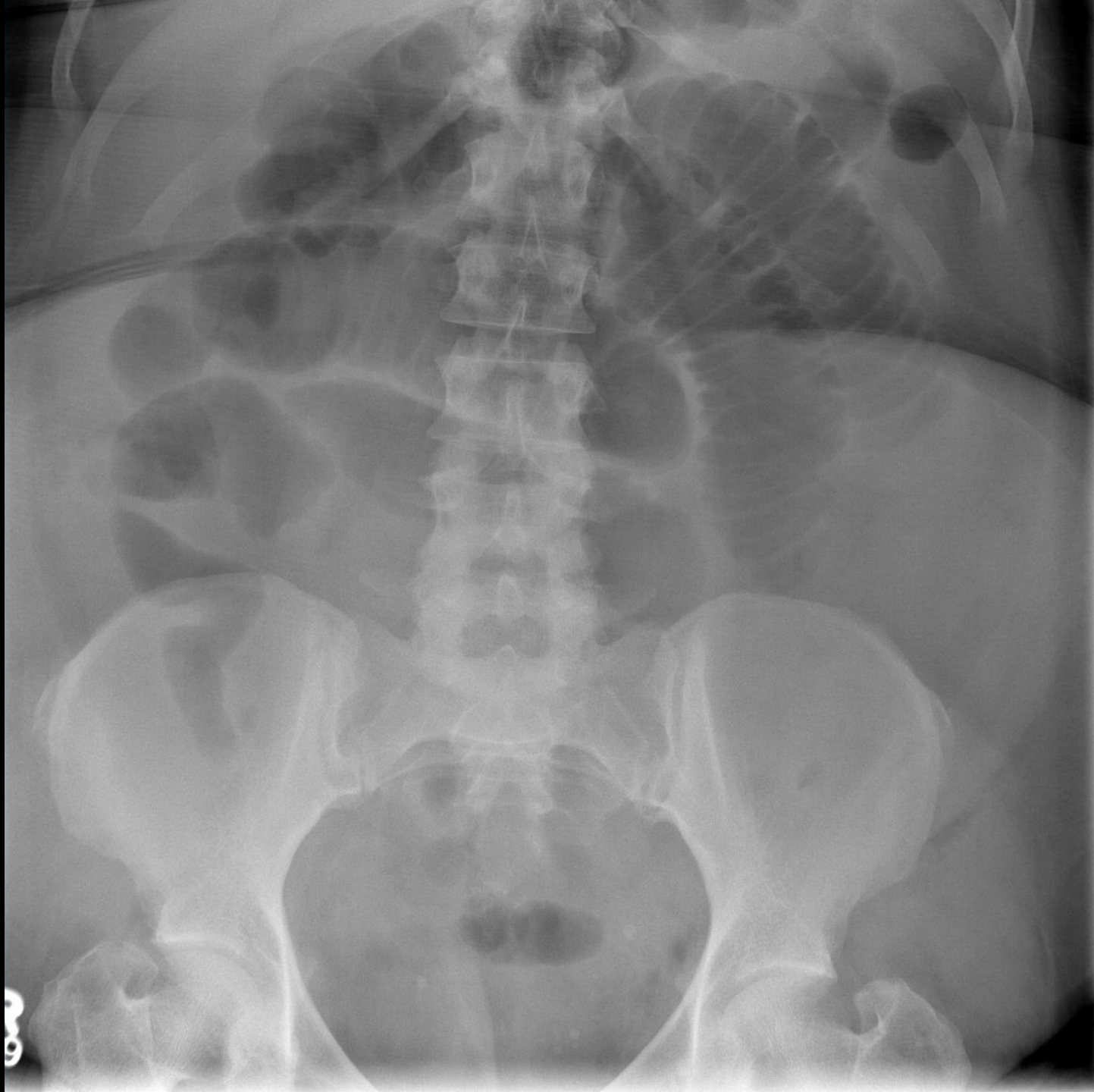
Hmm... the four main modalities used in abdominal imaging are:

- 1. Conventional x-ray**
- 2. Ultrasonography**
- 3. Computed tomography**
- 4. Magnetic resonance**



Conventional x-ray

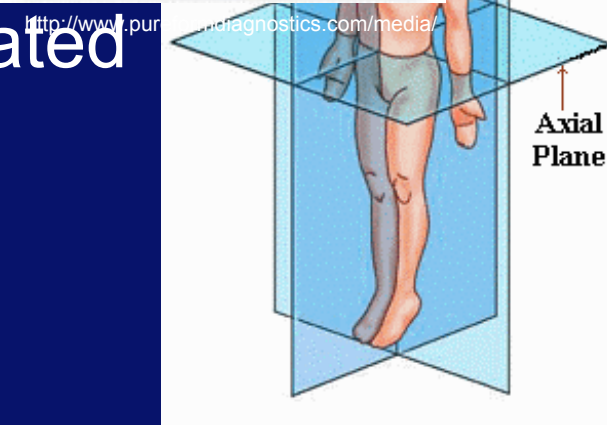
- Use
 - Traditionally used for screening
- Advantages
 - Availability and lower cost (\$50)
 - Well tolerated
- Disadvantages
 - Lower sensitivity
 - Ionizing radiation





Ultrasonography

- Use
 - Gallbladder, biliary tree, and female pelvis
 - *Aortic aneurysm* screening
 - Detection of free fluid
- Advantages
 - Availability and lower cost (\$200)
 - No ionizing radiation, well tolerated
 - Can image in any plane
- Disadvantages
 - Operator dependent
 - More difficult to interpret
 - Cannot penetrate gas-filled structures



HDI
5000

JOHNS HOPKINS HOSPITAL

0285
C5-2 Abd/Gen

26 Aug 09
8:01:00 am

TIs 0.6 MI 1.5
Fr #234 20.0cm

Map 3
170dB/C 3
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2D Opt:HSCT
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TRV RLL / RHV

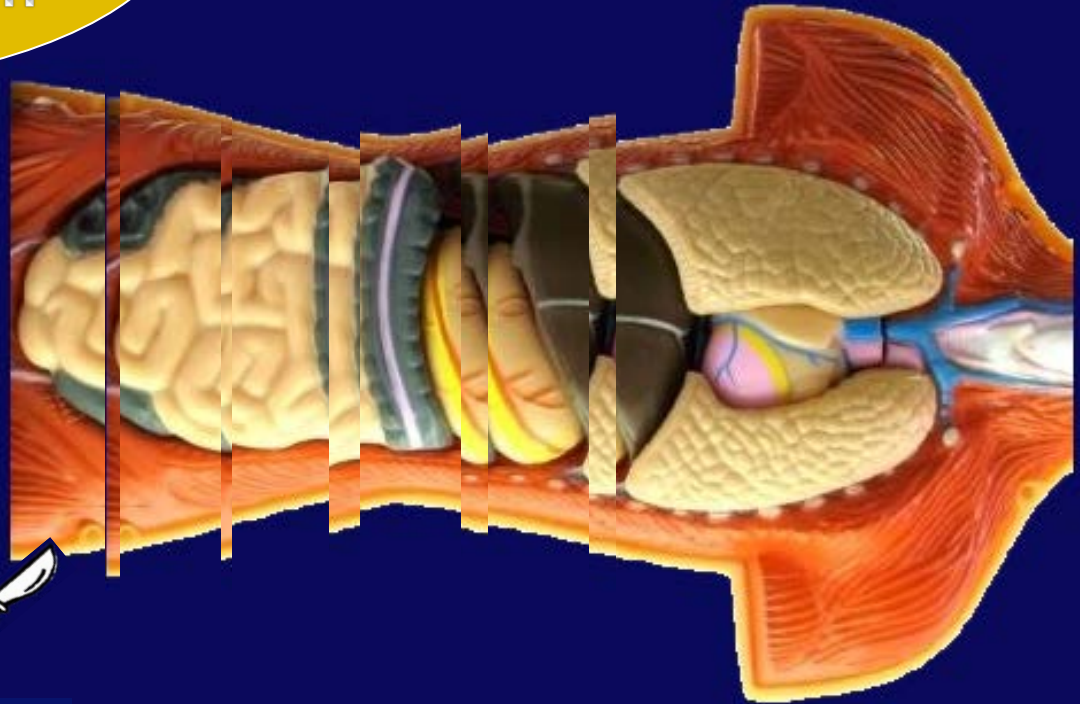
Computed Tomography

- Use
 - Imaging of choice for most abdominal abnormalities
- Advantages
 - High *spatial resolution*
 - Can see most structures simultaneously
 - Can reconstruct images in other planes
- Disadvantages
 - Cost (\$500)
 - Higher ionizing radiation dose than x-ray
 - Contrast reactions

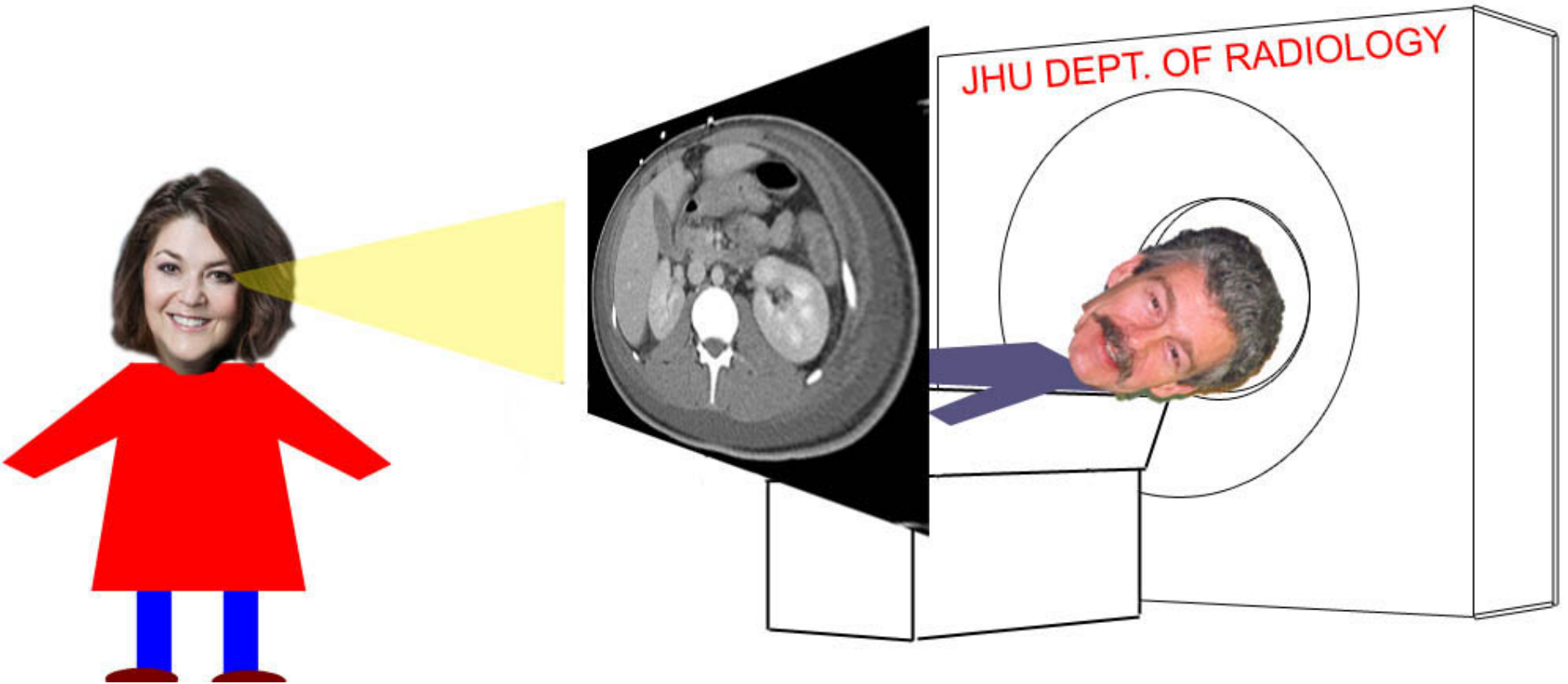
Computed Tomography

- Axial perspective (looking through the feet)
- You view one slice at a time
- Slice thickness can vary, but is generally 5 mm

Lets see, How to
make an axial
perspective...



Axial CT Perspective



Like looking
through the
feet! One slice
at a time.

Good to
remember!



Cross-Sectional Anatomy

Duodenum

L Lobe of Liver

Stomach

Gall Bladder

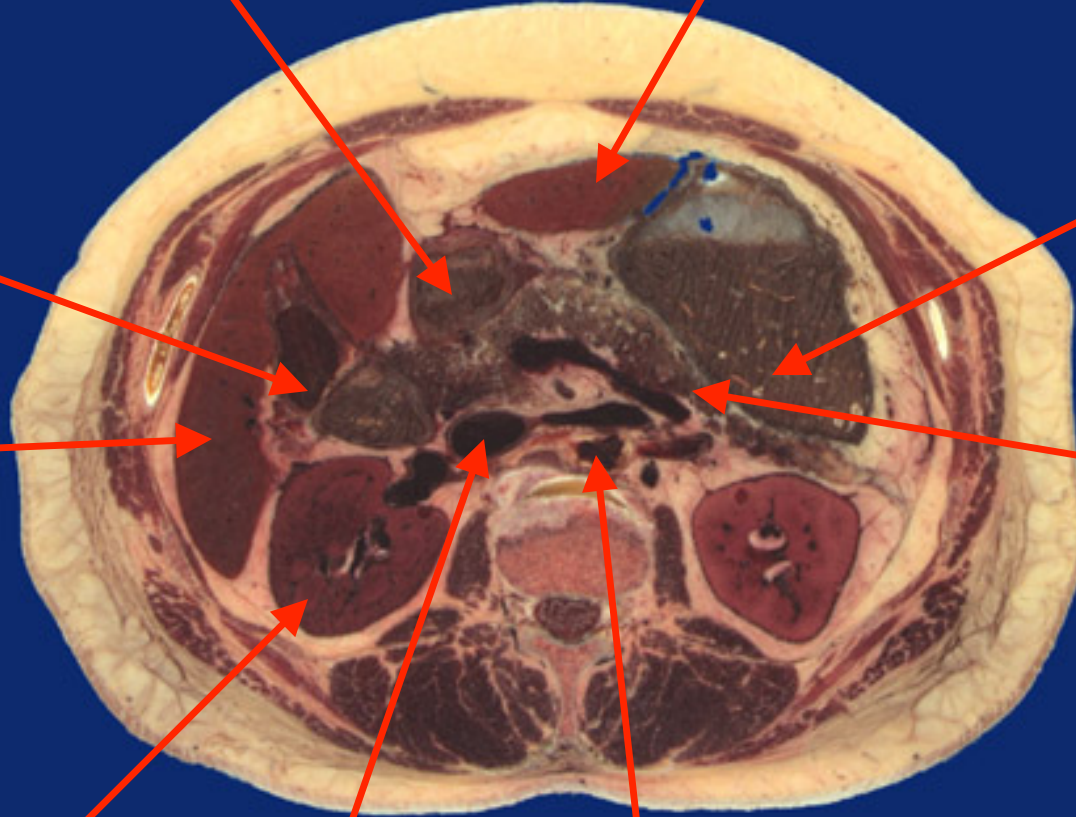
Liver

Pancreas

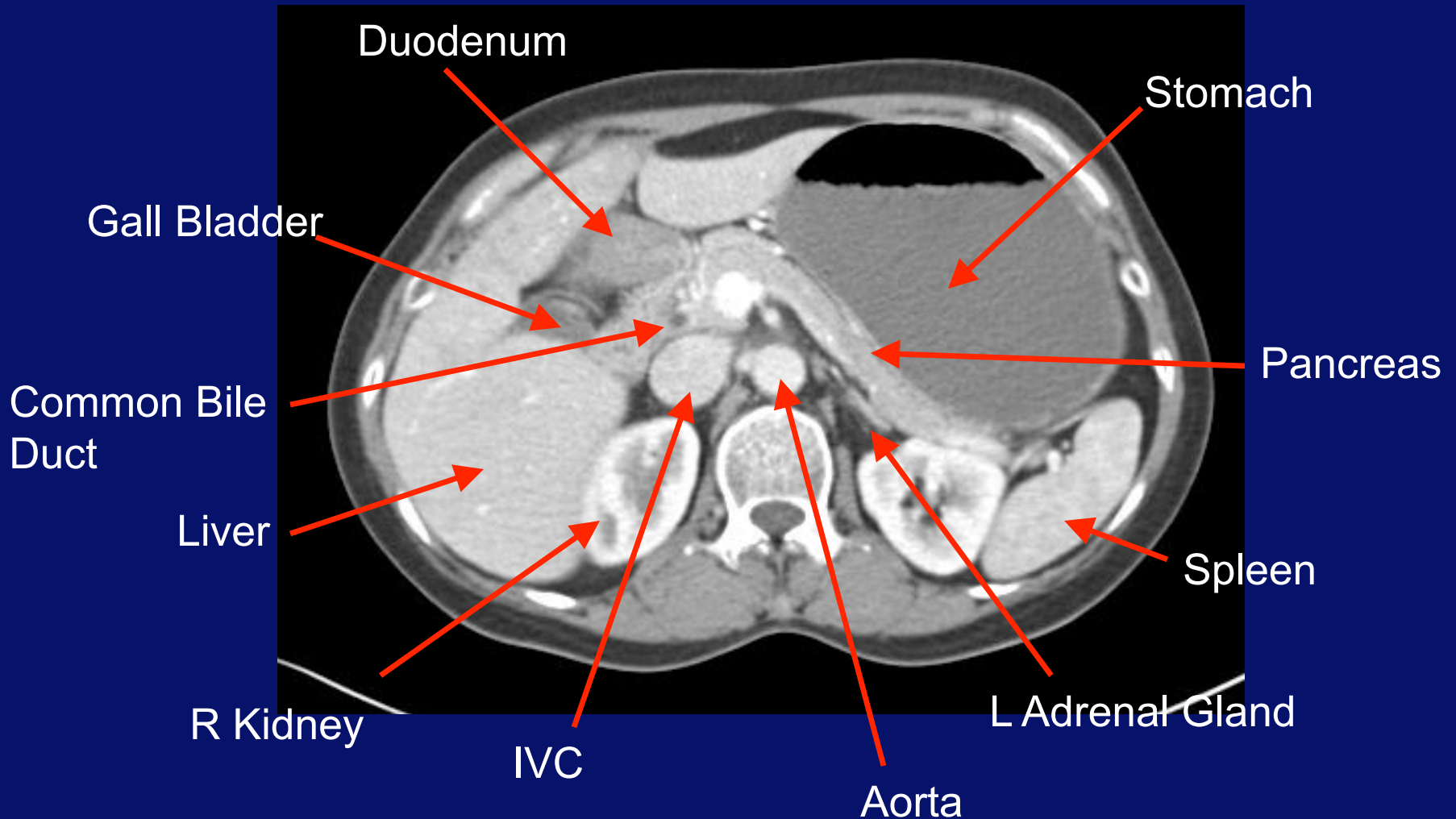
R Kidney

IVC

Aorta



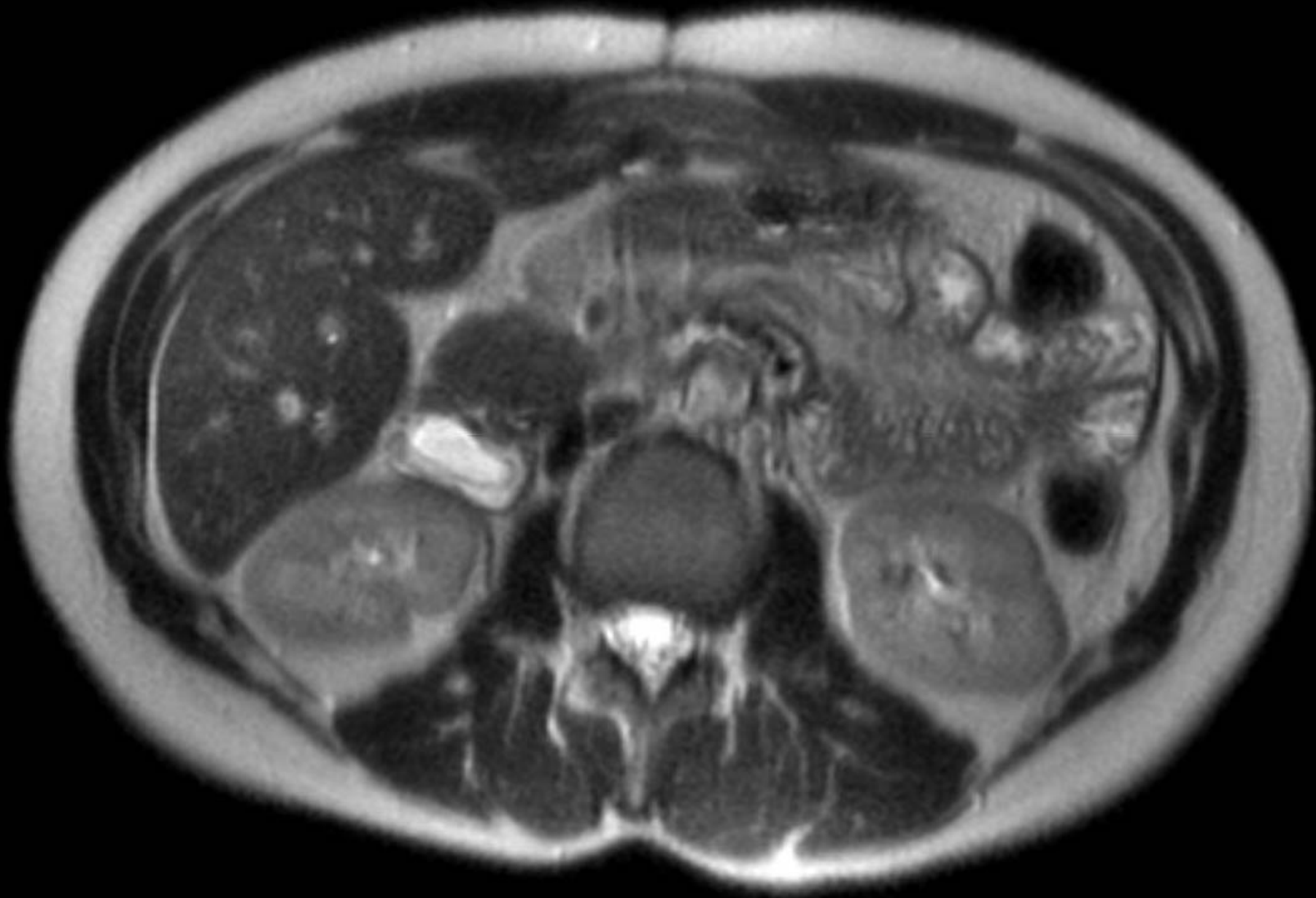
Cross-Sectional Imaging



Magnetic Resonance

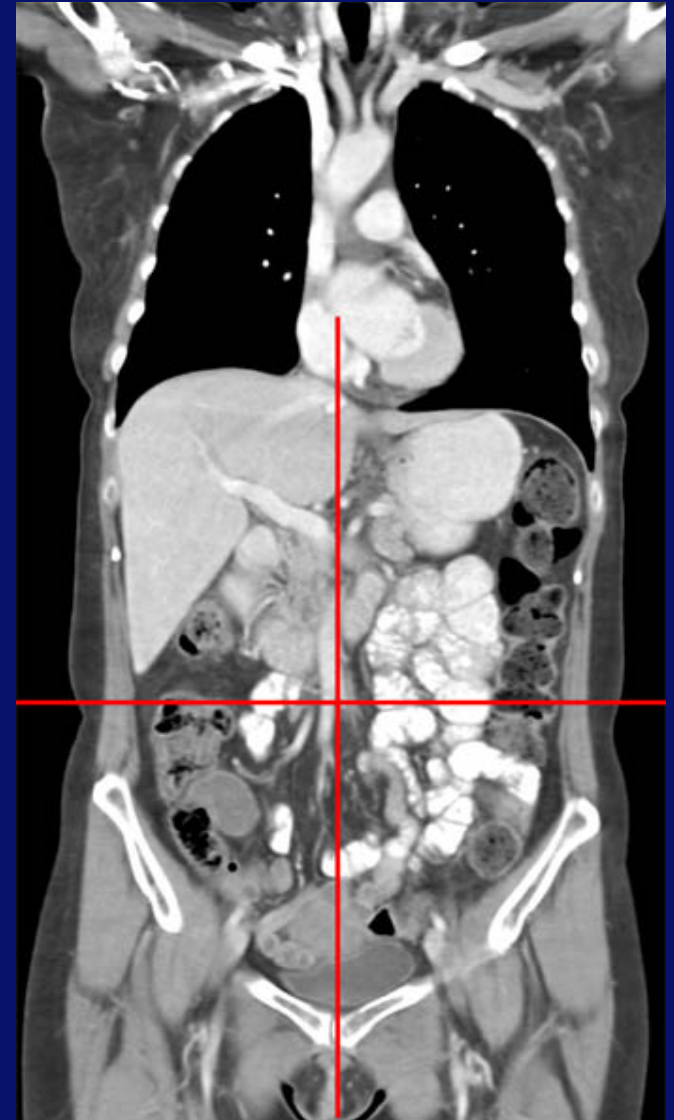
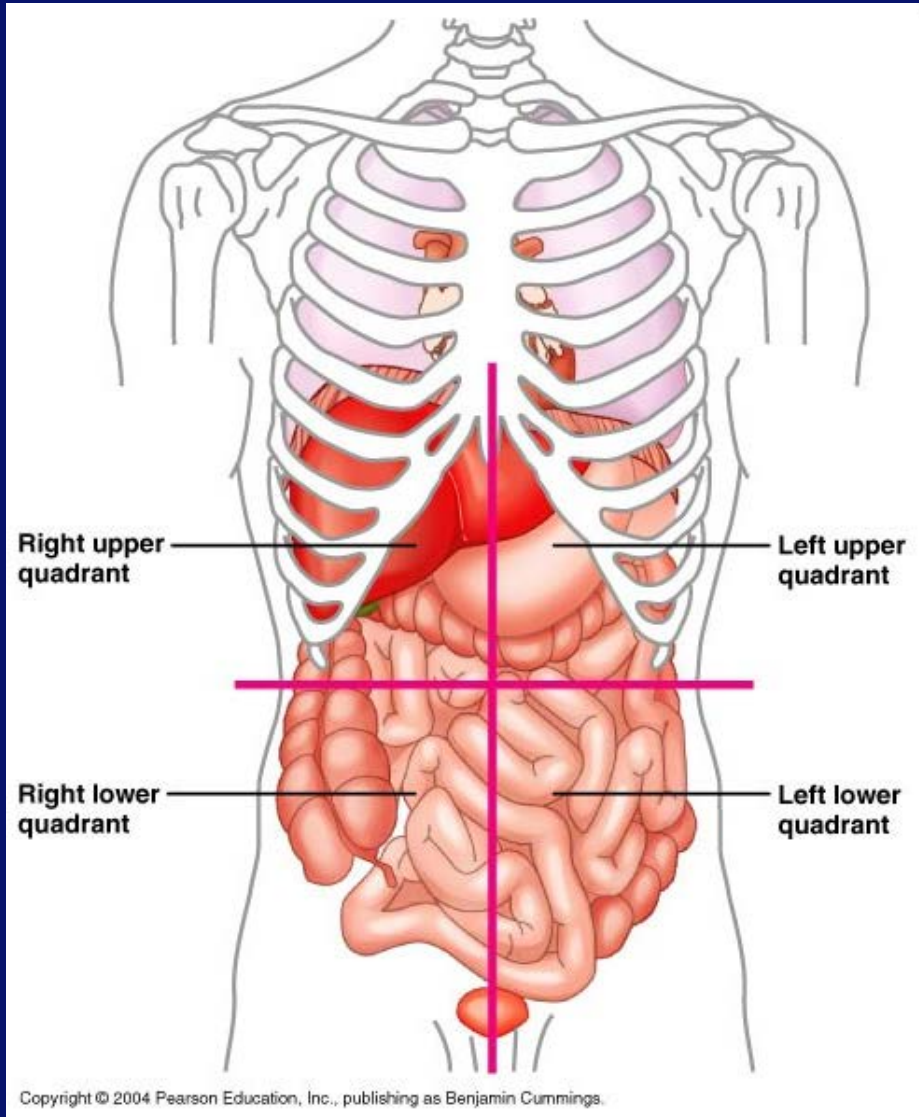
- Use
 - Difficult diagnoses
 - Cancer staging
 - Vascular anatomy
- Advantages
 - Soft tissue contrast
 - No ionizing radiation
 - No *iodinated contrast*
- Disadvantages
 - Cost and availability (\$800)
 - Scans take much longer
 - Implanted devices can make imaging difficult

MRI

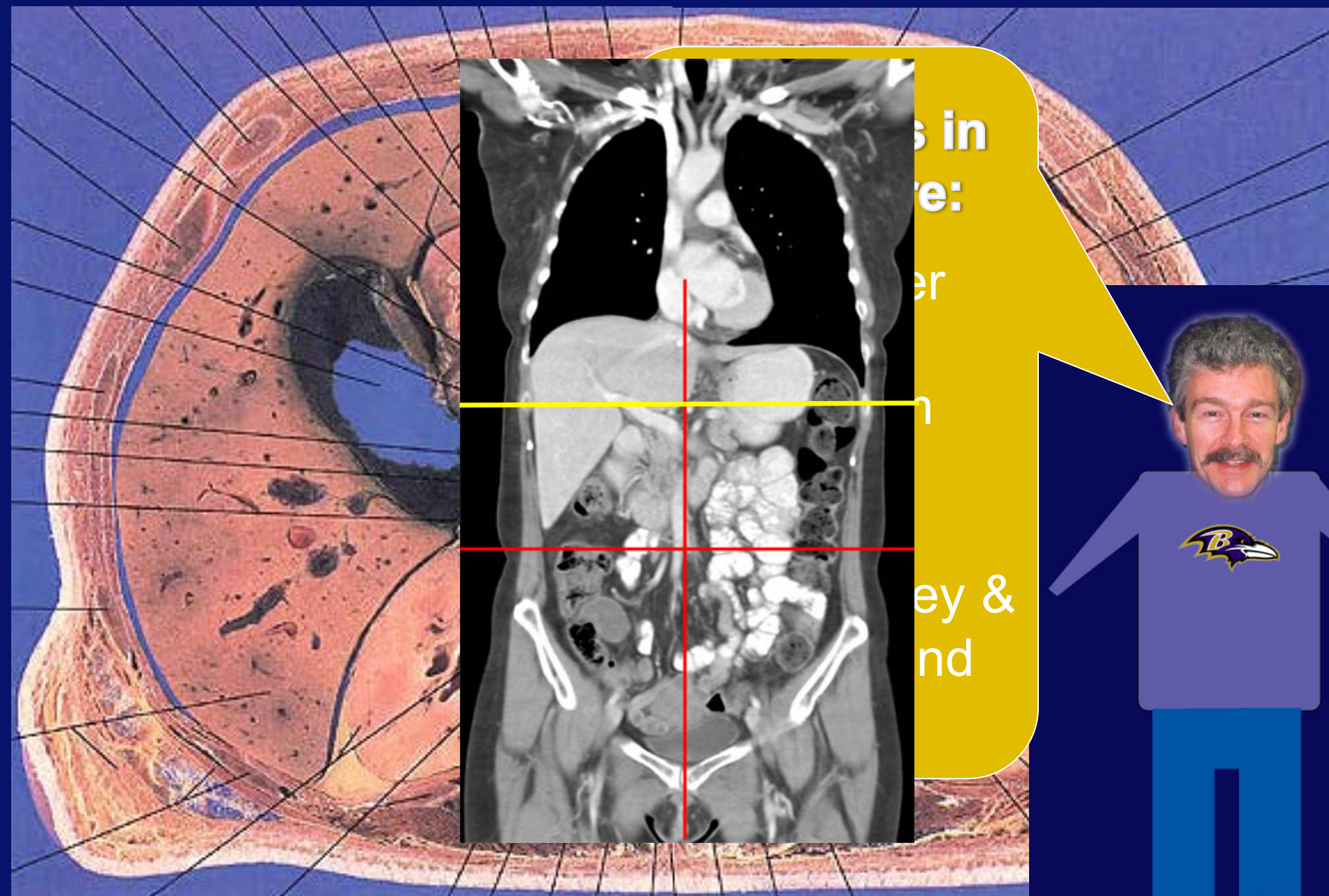




The Abdominal Quadrants



Right Upper Quadrant



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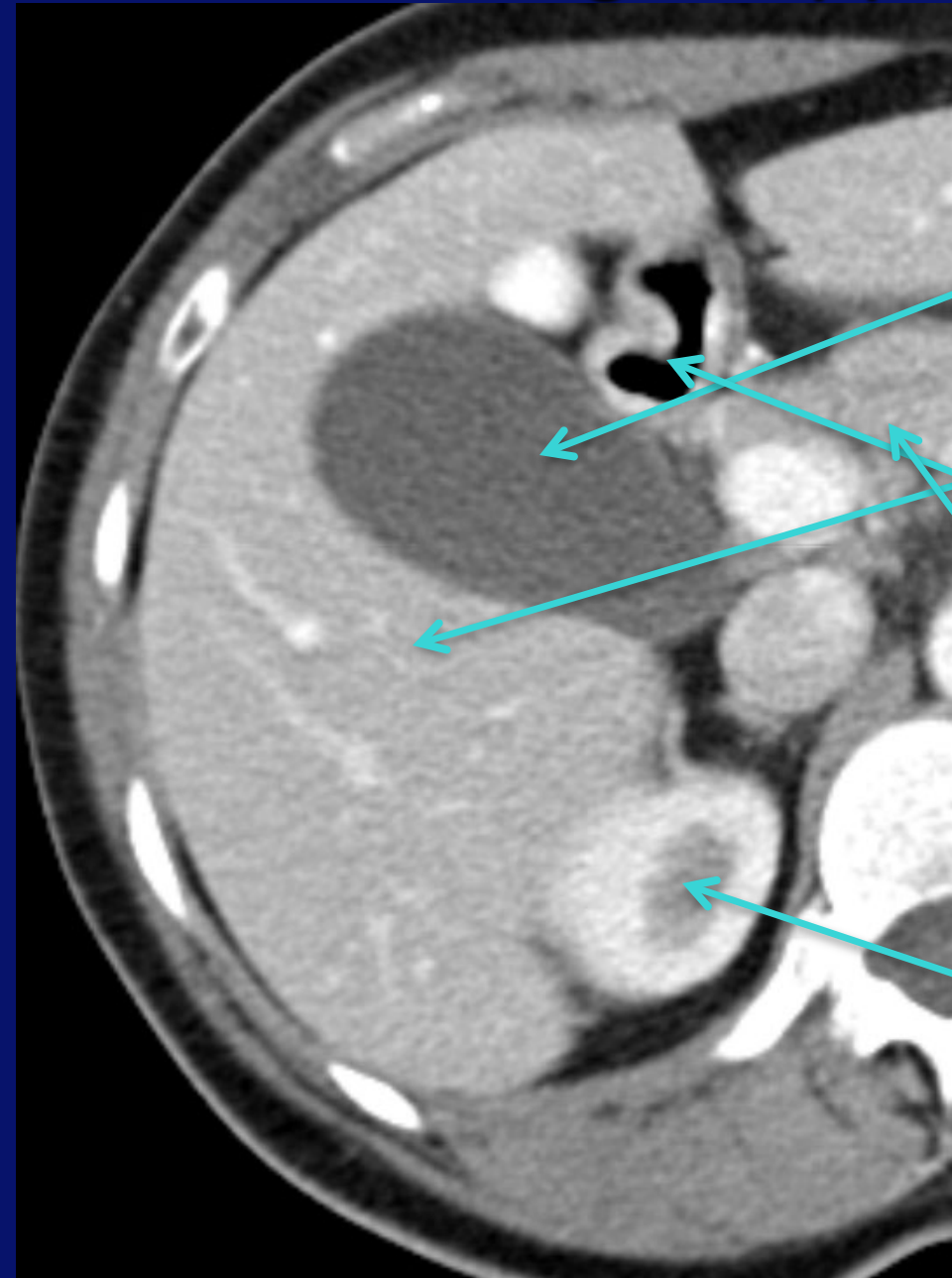
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Right Upper Quadrant



Right Upper Quadrant



- *RUQ* Organs
 - Gallbladder & biliary system
 - Liver (right lobe)
 - Duodenum (1/2/3 parts)
 - Pancreas (head)
 - Colon (Hepatic flexure/transverse)
 - Right kidney & adrenal gland

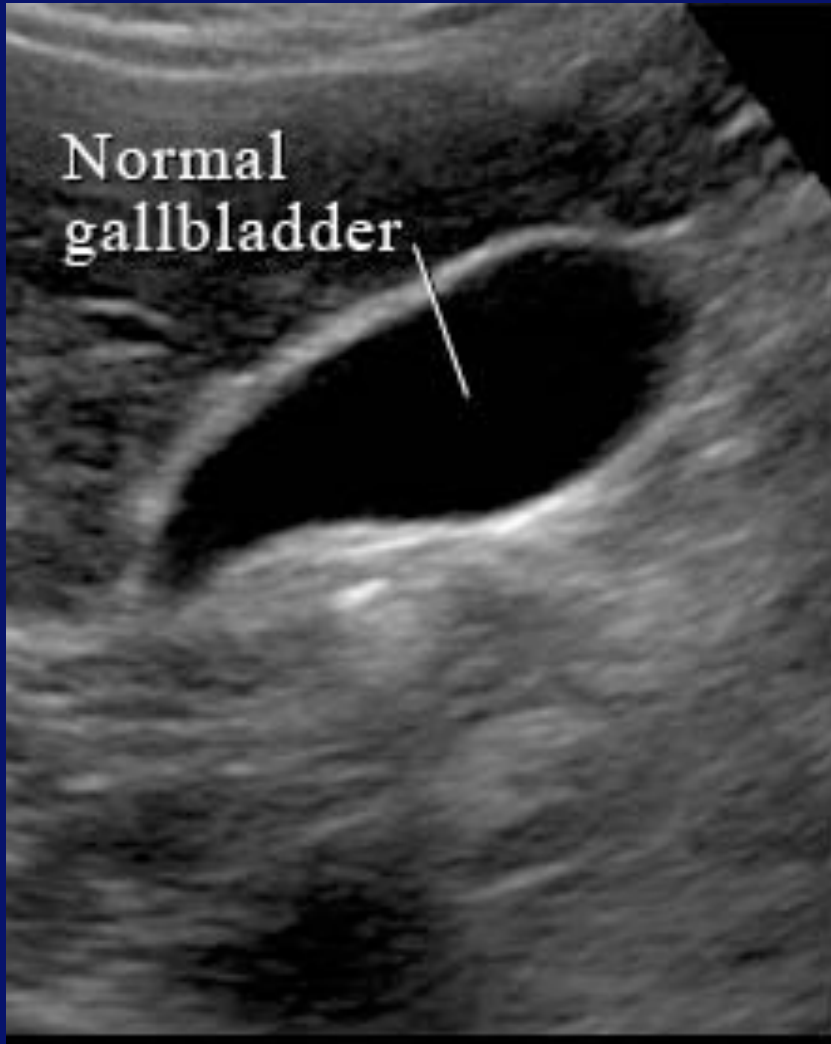
Case 1

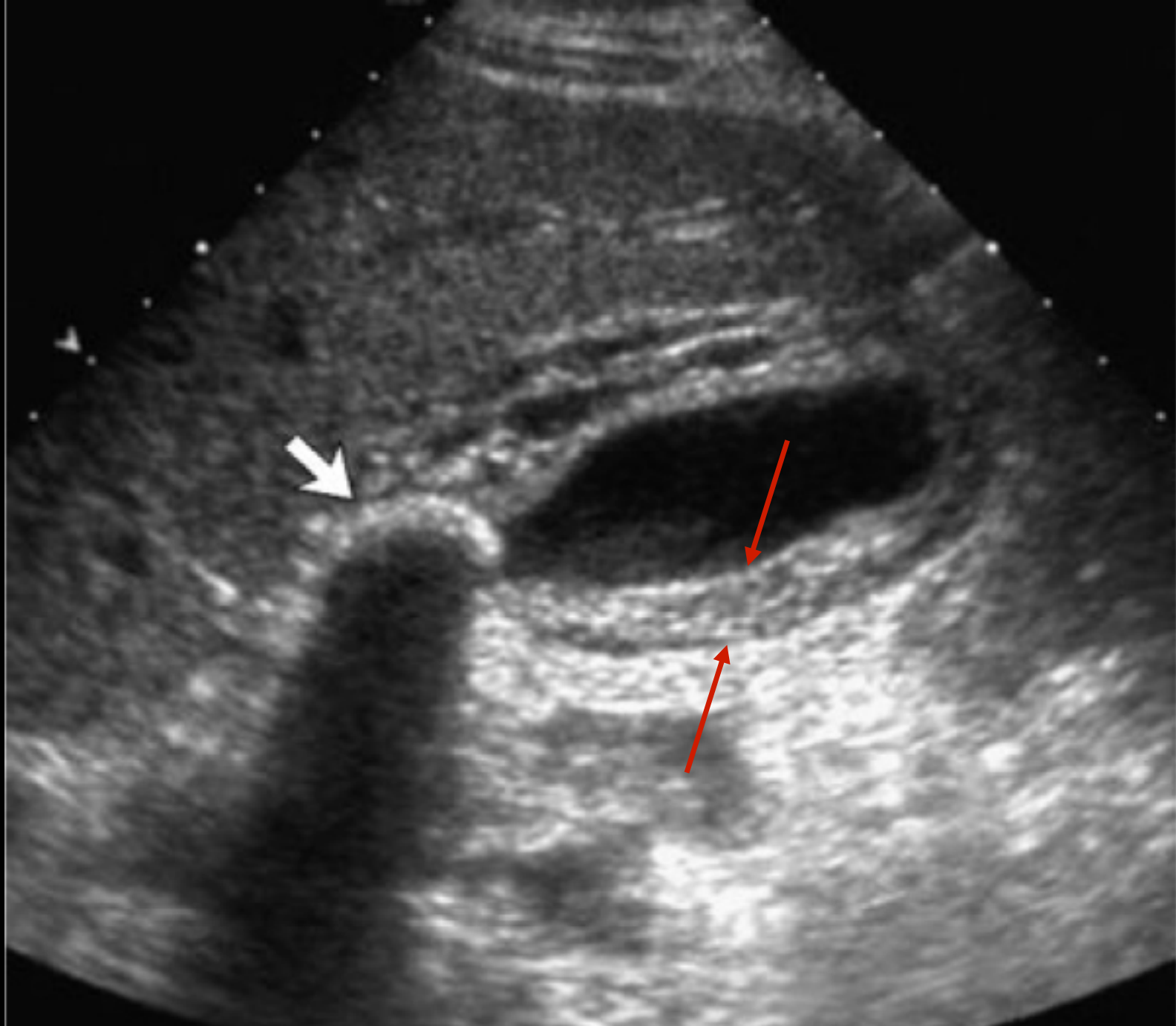
A 20 year old woman presents to the ED with the complaint of RUQ pain with nausea and vomiting after eating a cheeseburger for dinner.

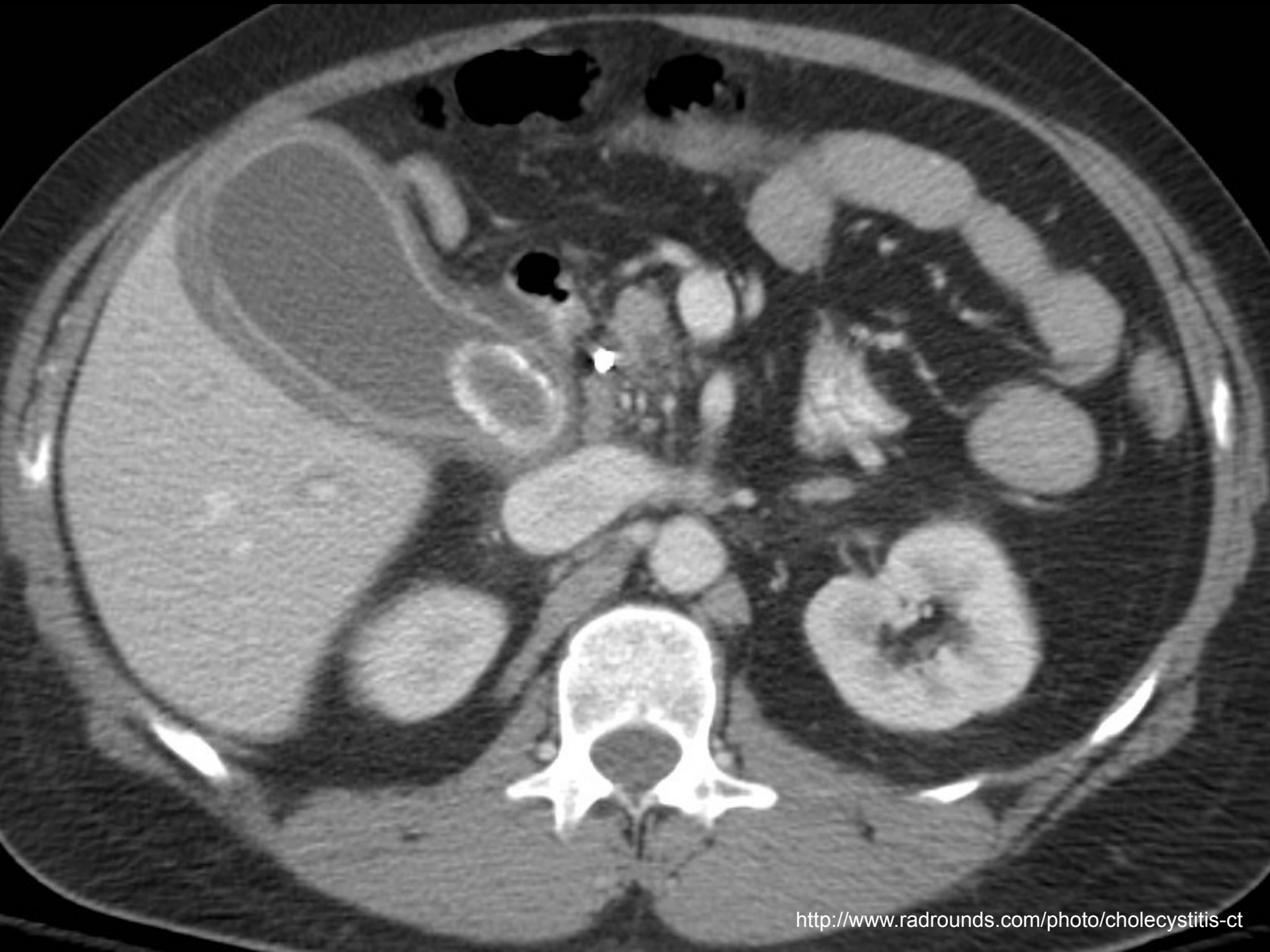
On exam, she has moderate RUQ tenderness with palpation. Her *WBC* count is high and she has a fever.

What imaging test would you request?

RUQ Ultrasound



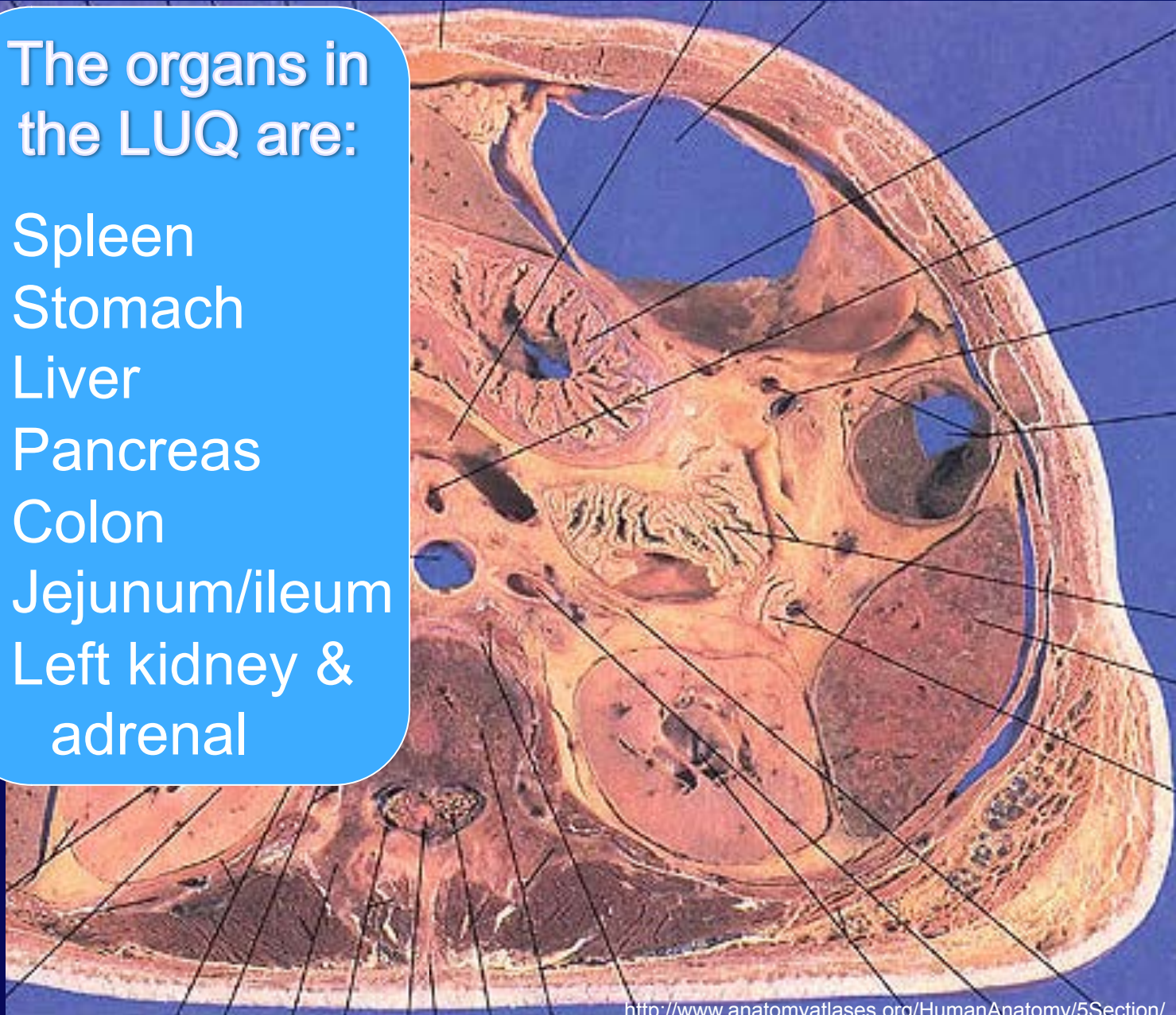




Left Upper Quadrant

The organs in the LUQ are:

- Spleen
- Stomach
- Liver
- Pancreas
- Colon
- Jejunum/ileum
- Left kidney & adrenal



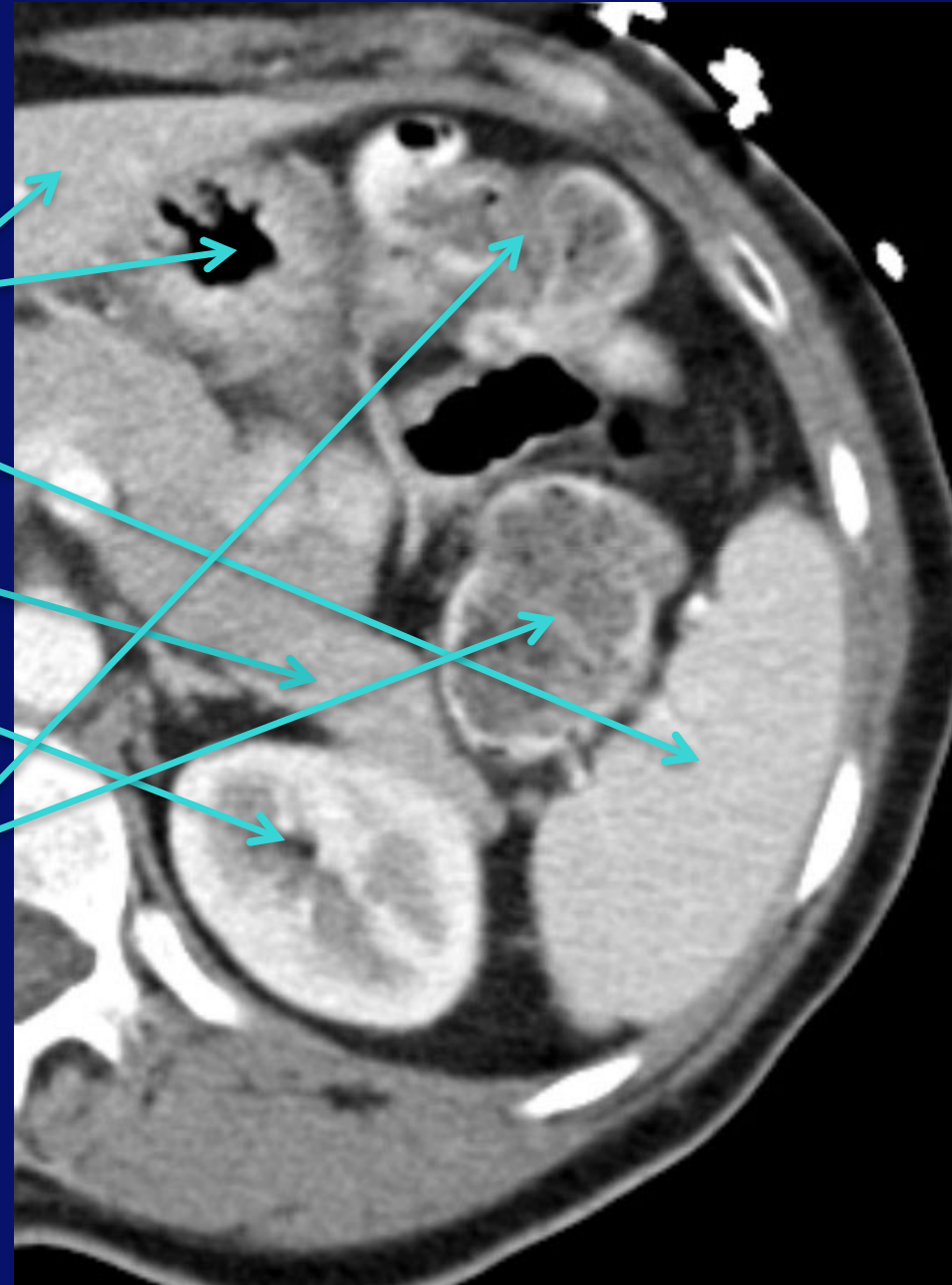
Left Upper Quadrant



Left Upper Quadrant

- *LUQ* Organs

- Spleen
- Stomach
- Liver (left lobe)
- Pancreas (body/tail)
- Left kidney/adrenal
- Colon (transverse/
splenic flexure)
- Jejunum/ileum



Case 2

A 45 year old man comes in to the ED after being involved in high speed *MVA*. He has emergency surgery and a week later he has a fever and severe LUQ pain.

What do you think has happened to him?



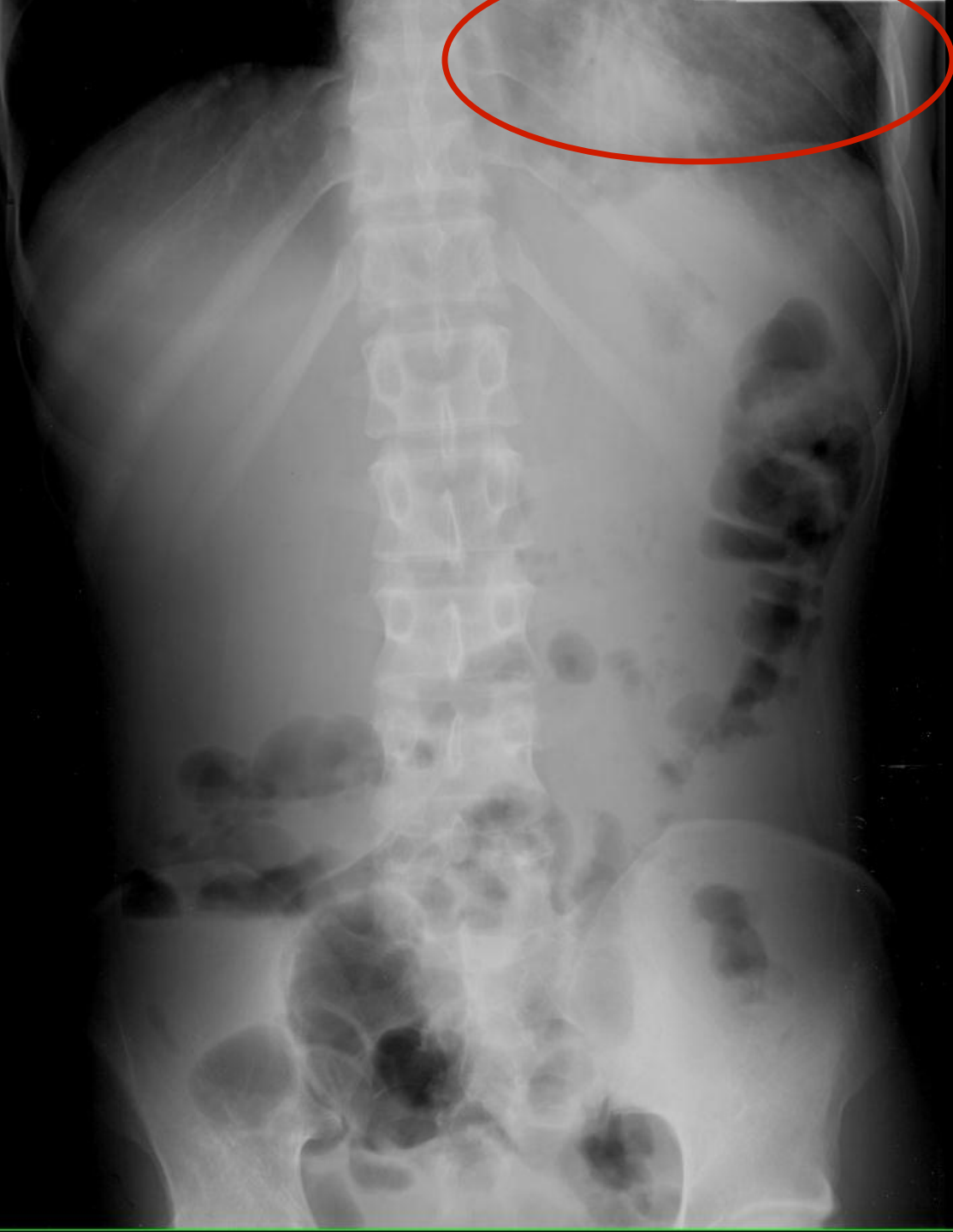
Case 3

A 41 year old man presents to the ED complaining of fever, vague LUQ pain, and *SOB* for two days.

The patient's abdominal exam reveals left upper quadrant tenderness.

You request an abdominal x-ray.

RO 38



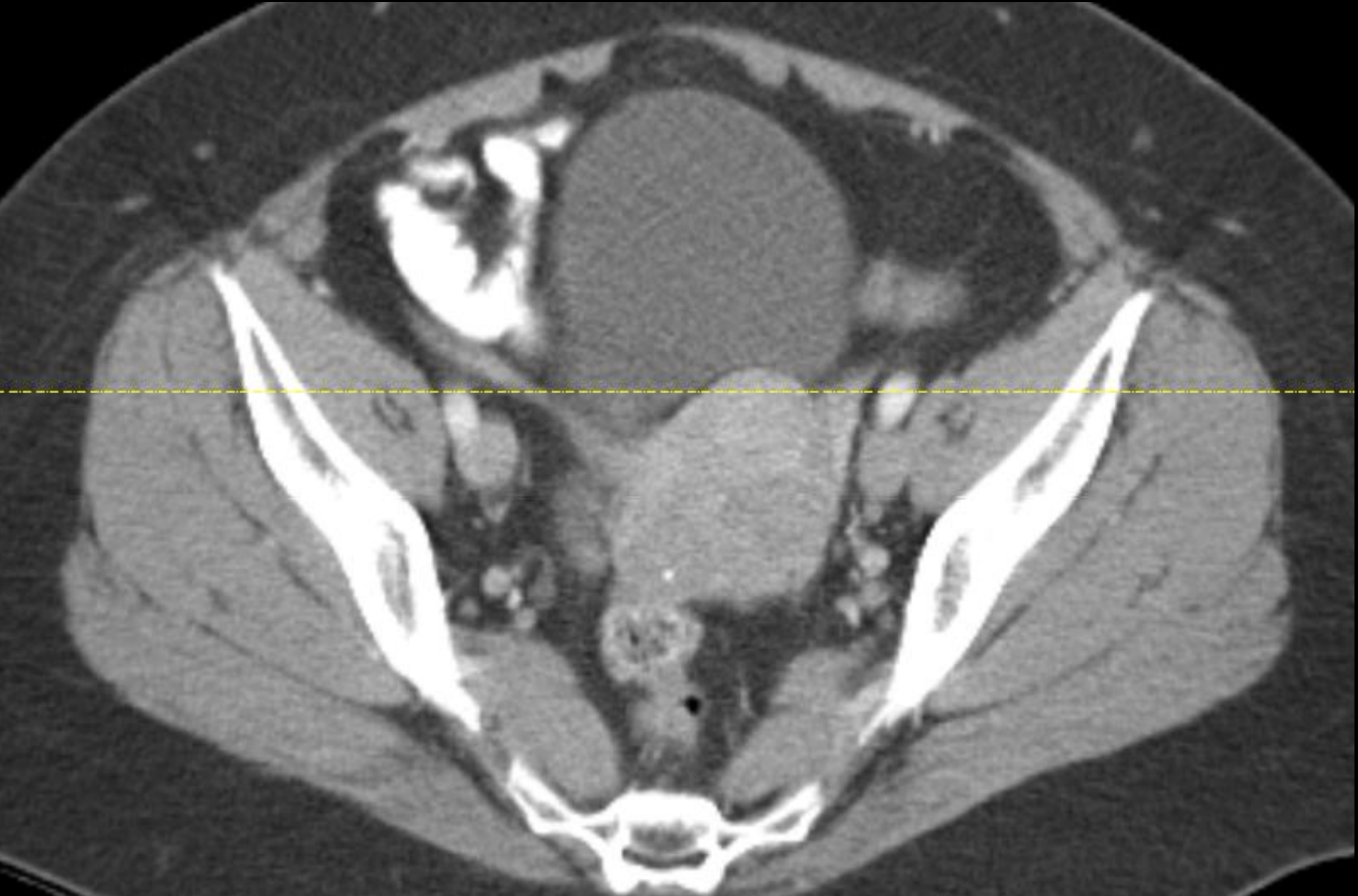
Right Lower Quadrant

The organs in the RLQ are:

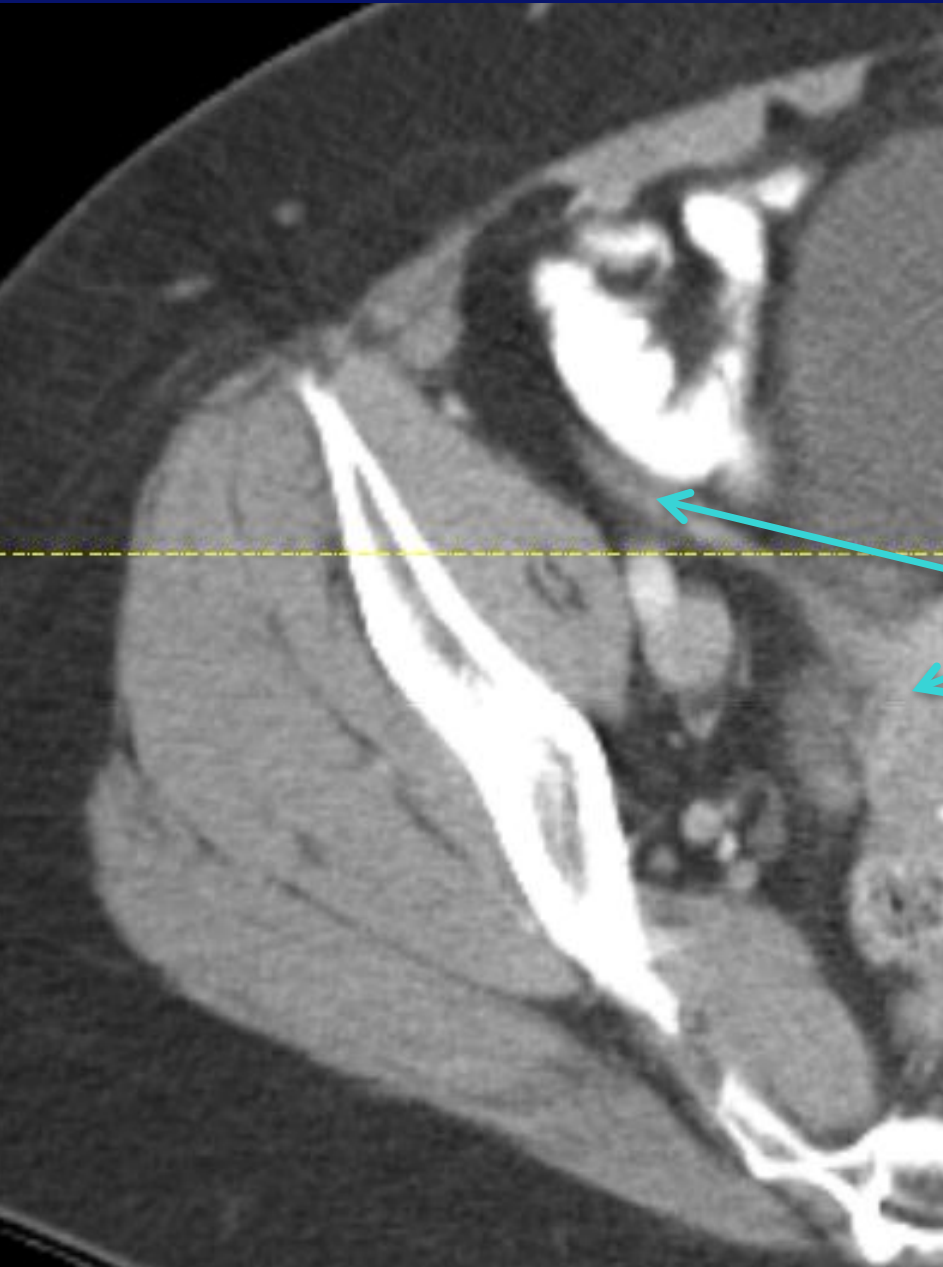
- Ascending colon
- Cecum/ileum
- Appendix
- Right ovary, fallopian tube, & uterus
- Right ureter



Right Lower Quadrant

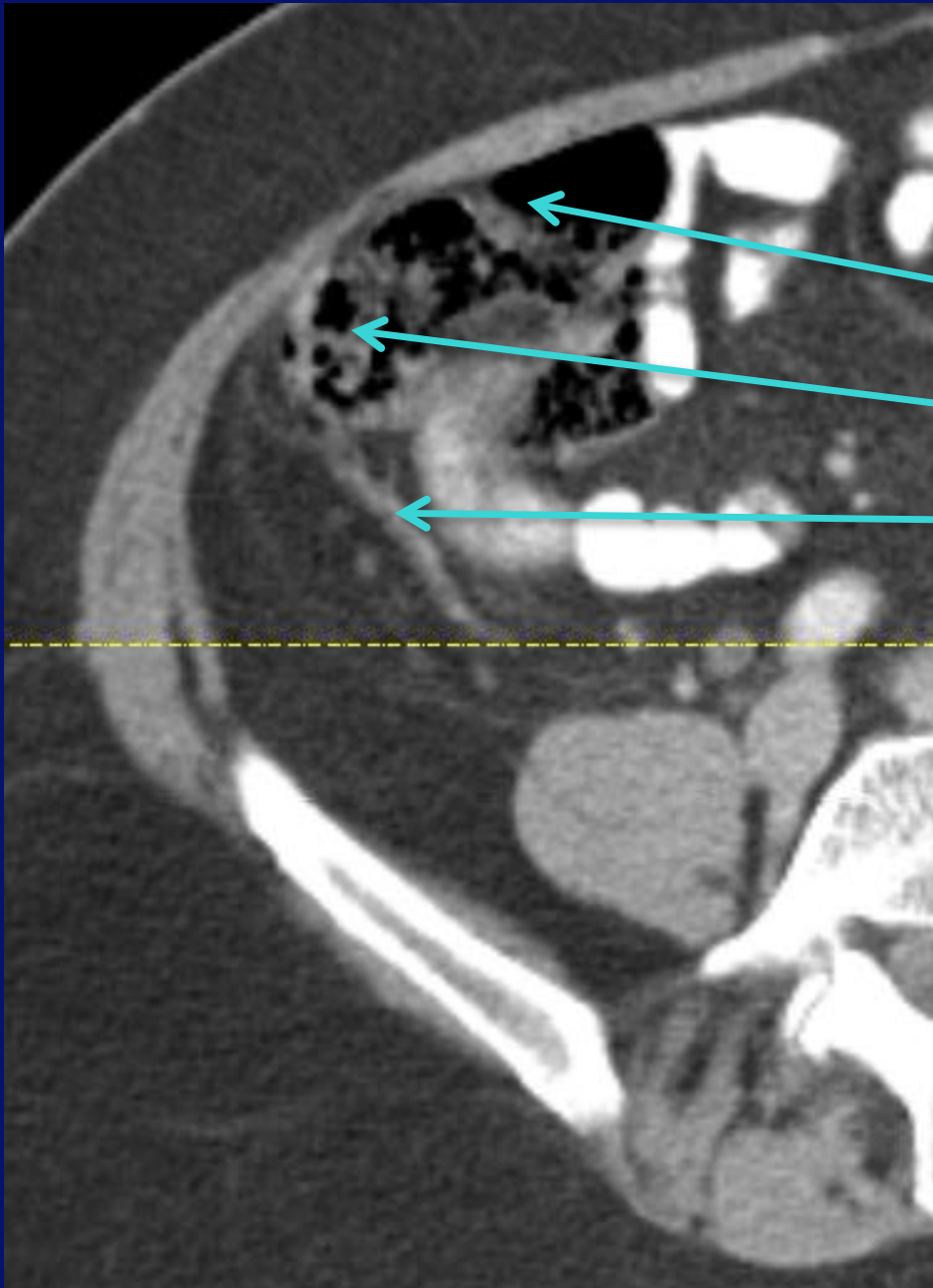


Right Lower Quadrant



- *RLQ* Organs
 - Ascending colon
 - Cecum/ileum
 - Appendix
 - Right ovary/
fallopian tube/
uterus
 - Right ureter

Right Lower Quadrant



- *RLQ* Organs
 - Ascending colon
 - Cecum/ileum
 - Appendix
 - Right ovary/
fallopian tube/
uterus
 - Right ureter

Case 4

A 28 year old female presents to the ED complaining of abdominal pain that was initially in the periumbilical area and then moved to the RLQ. She has also had nausea and vomiting.

The patient's abdominal exam reveals right lower quadrant *rebound tenderness* as well as guarding. She has a fever and WBC count is high. Her pregnancy test is negative.

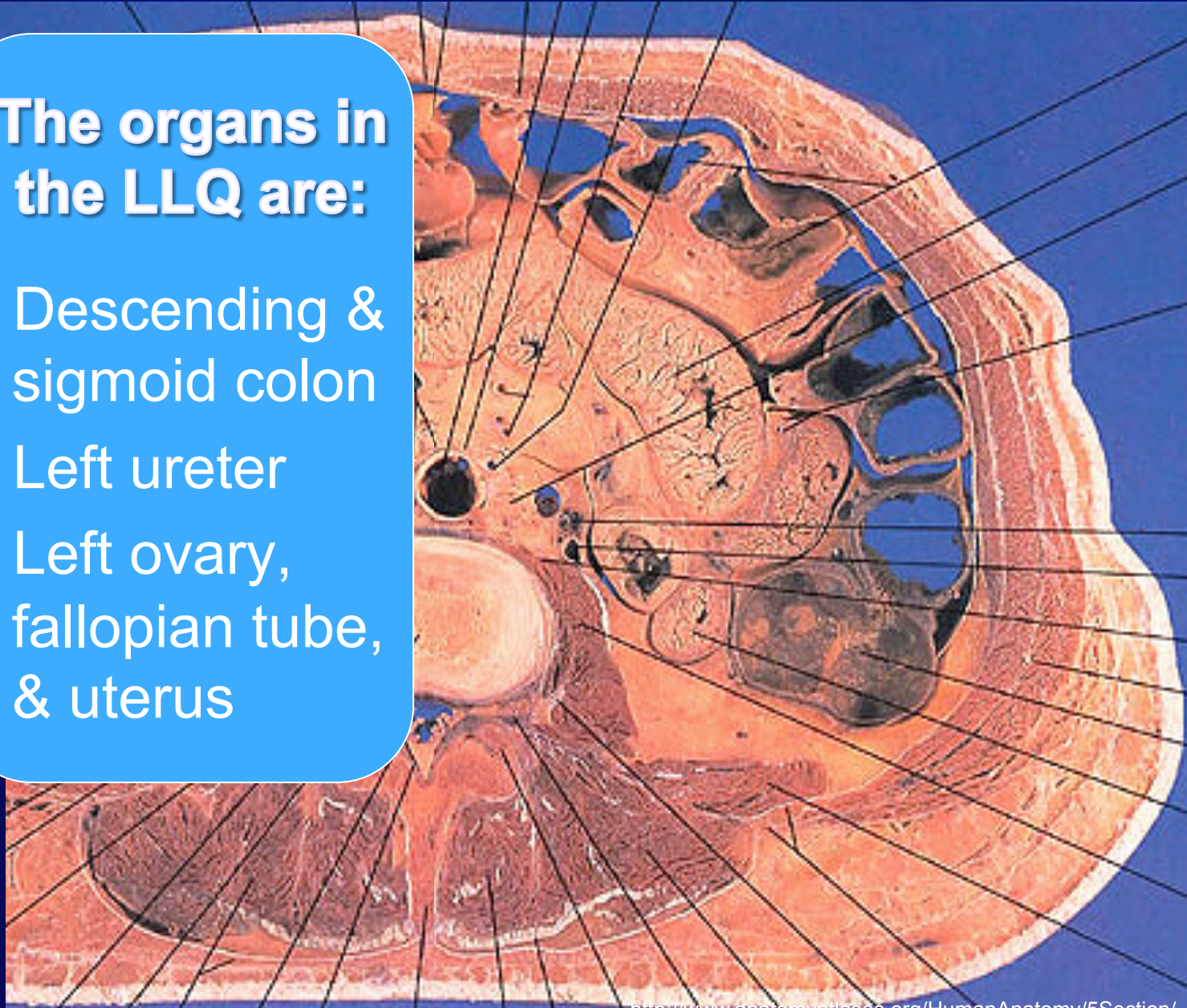
What do you suspect?



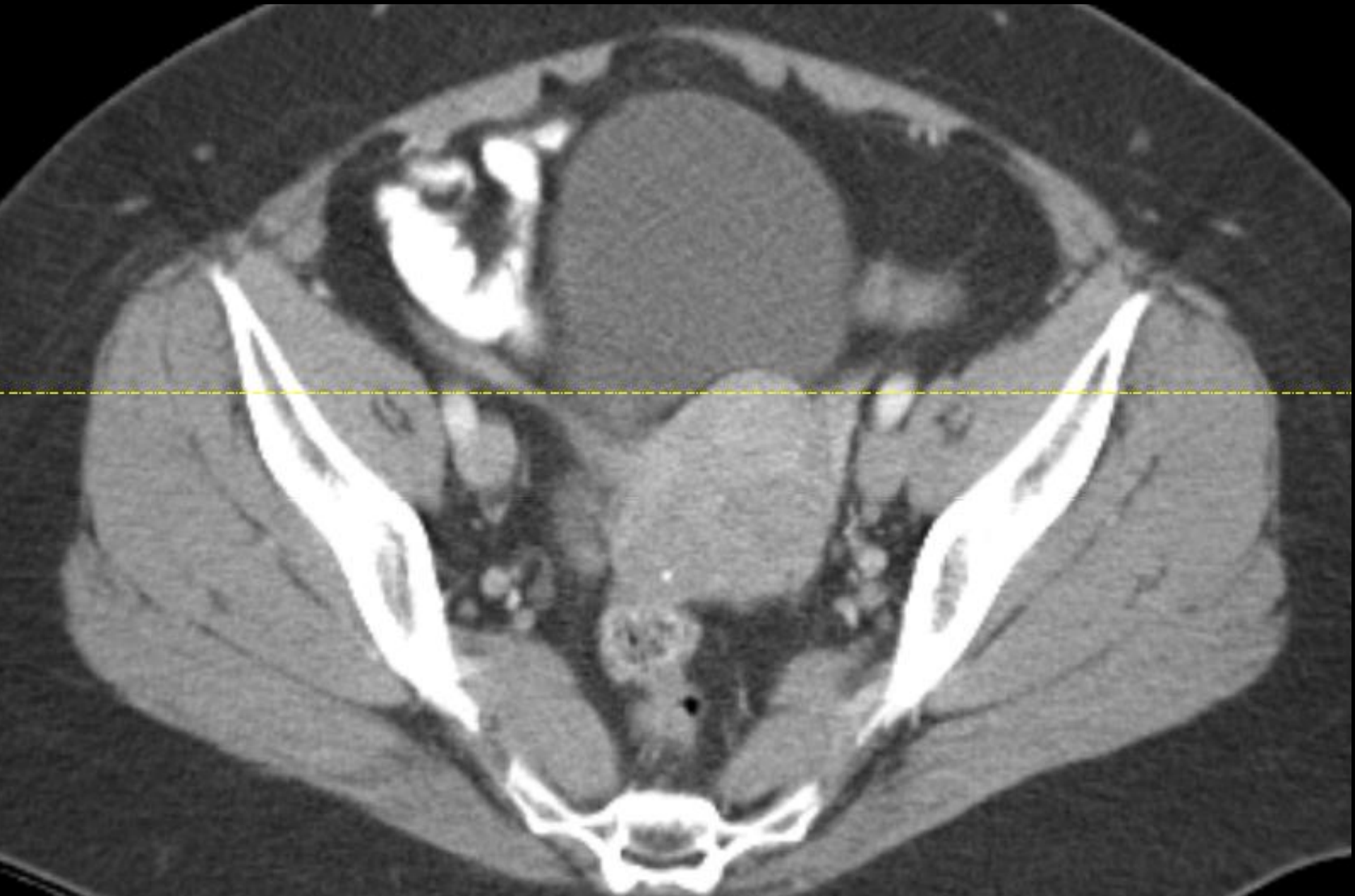
Left Lower Quadrant

The organs in the LLQ are:

- Descending & sigmoid colon
- Left ureter
- Left ovary, fallopian tube, & uterus

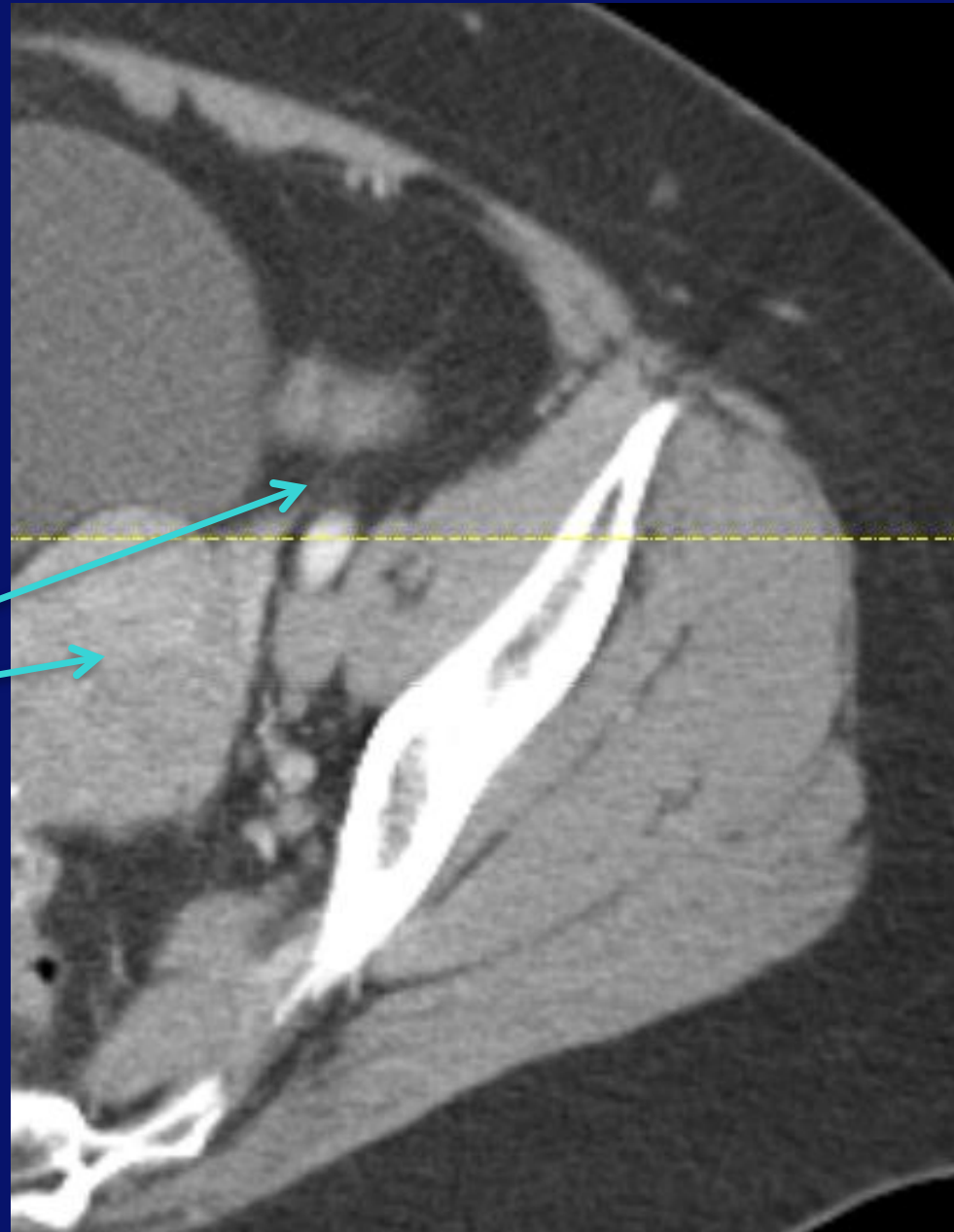


Left Lower Quadrant



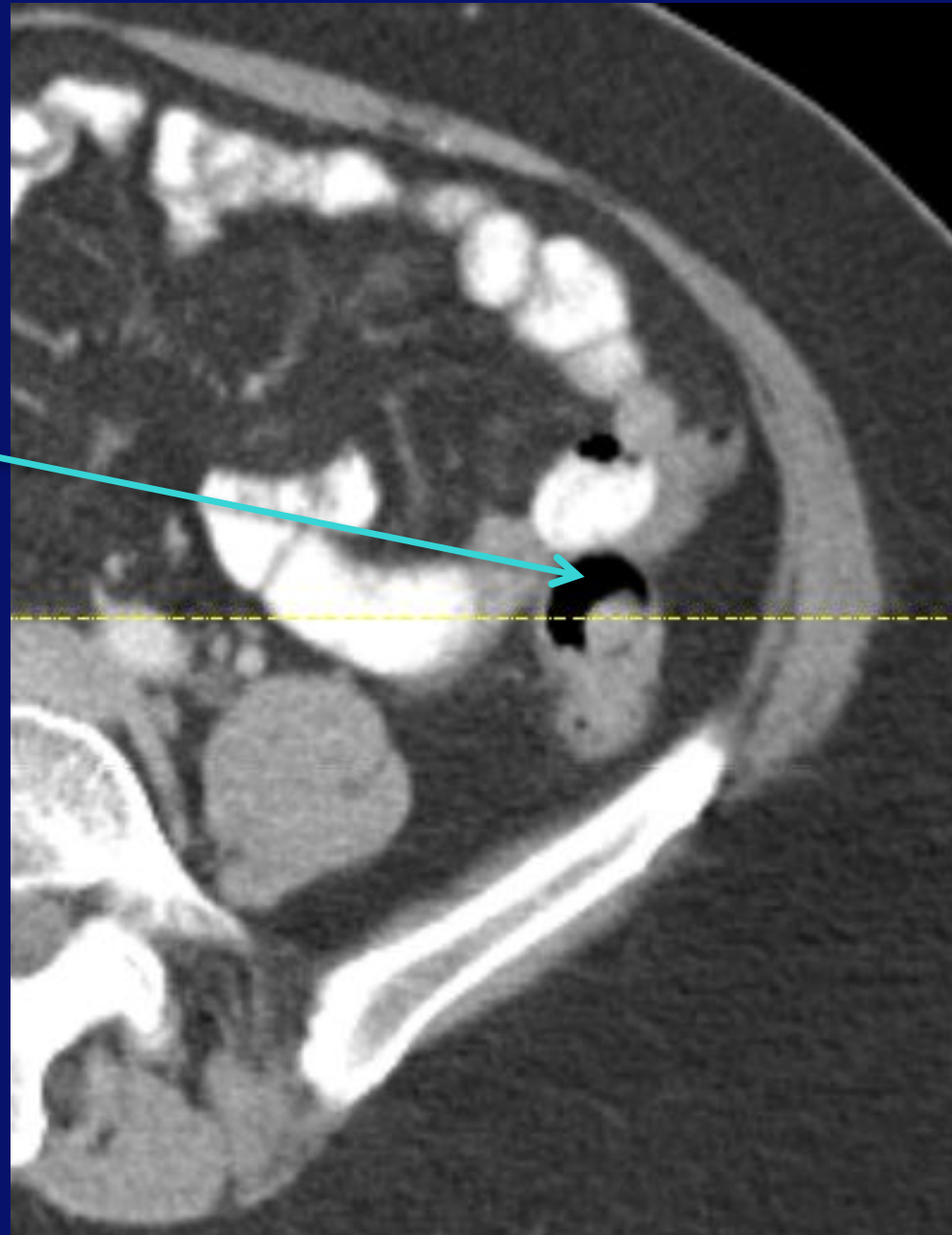
Left Lower Quadrant

- LLQ Organs
 - Descending/sigmoid colon
 - Left ureter
 - Left ovary/fallopian tube/uterus



Left Lower Quadrant

- *LLQ* Organs
 - Descending/sigmoid colon
 - Left ureter
 - Left ovary/fallopian tube/uterus



Case 5

A 58 year old man presents to the ED complaining of lower abdominal pain and fever.

On physical examination, he has moderate LLQ and suprapubic tenderness. His WBC count is high and he has a fever.

What organ do you think may be involved?



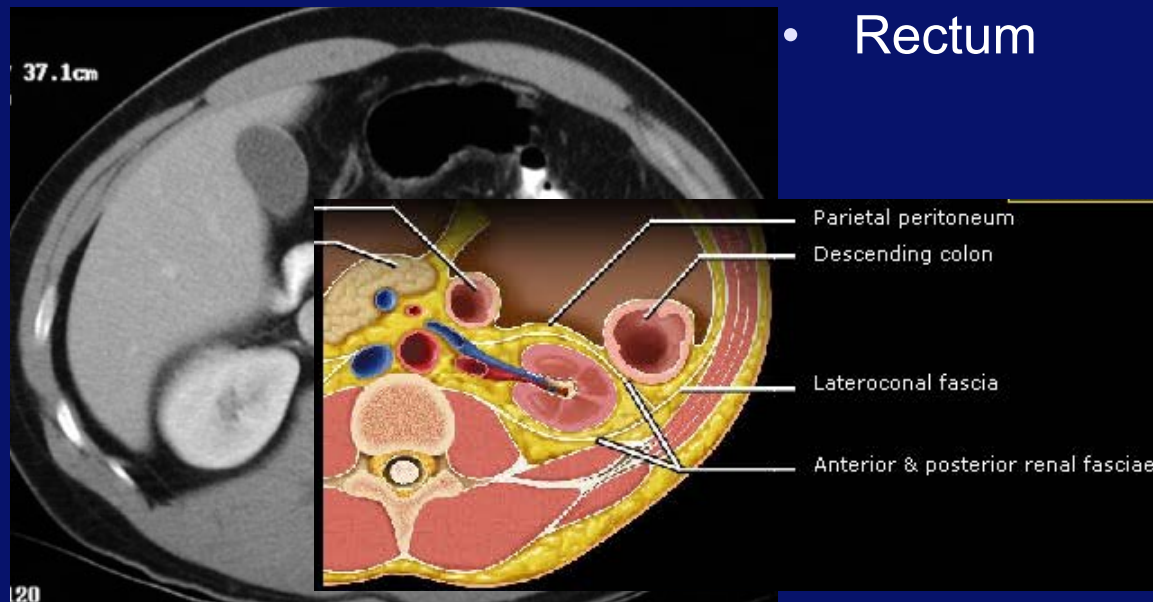
120
250



Retroperitoneum

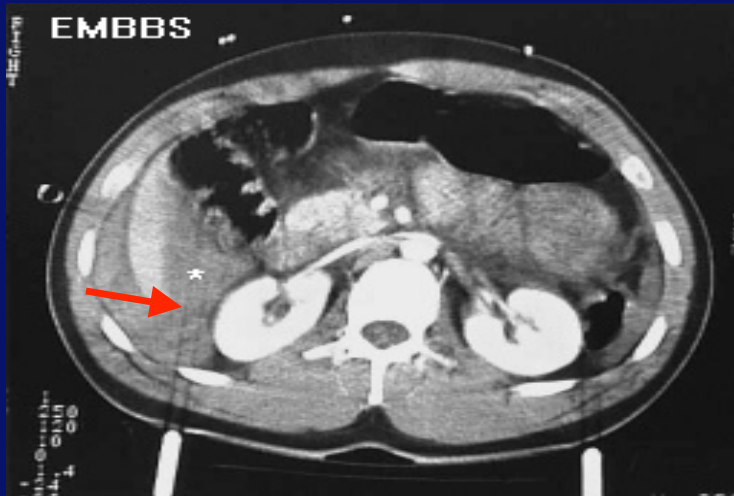
What organs are Retroperitoneal?

- Retroperitoneal Organs:
- Kidneys
- Pancreas
- Duodenum
- Ascending Colon
- Descending Colon
- Rectum
- Rucker
- Kids
- Party
- Down with
- AC
- DC
- Records



Case 6 & 7

- Where would you expect to find blood from liver trauma?



The liver is a peritoneal organ, so blood is commonly seen in the paracolic gutters.

Here there is blood in Morrison's pouch (between liver and right kidney)

- Where would you expect to find blood from kidney trauma?



A patient injured in a motor vehicle crash with renal lacerations. There is hemorrhage that is loculated by the retroperitoneal septa.

Summary

- The main imaging modalities for the abdomen are x-ray, ultrasound, CT, and MRI.
- The abdomen can be divided into four quadrants, each containing specific visceral organs.
- Abdominal organs can also be categorized as to whether are retroperitoneal.
- An understanding of the quadrant anatomy allows you to identify relevant pathology.

**THANK
YOU!**

