

EMERGENCY RADIOLOGICAL ALGORITHM

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LEARNING OBJECTIVES

- Imaging methods
- Abdominal emergencies
- Thoracic emergencies
- Radiologic approach to thoracic and abdominal emergencies
- Radiologic approach to trauma

IMAGING MODALITIES

- RADIOGRAPHY (X-RAY)
- COMPUTED TOMOGRAPHY (X-RAY)
- ULTRASOUND (uses sound waves to create a picture)
- MAGNETIC RESONANCE (uses a magnetic field and computer-generated radio waves to create detailed images of the organs)



The Acute Abdomen



ACUTE ABDOMINAL PAIN

- The 'acute abdomen' is defined as a sudden onset of severe abdominal pain developing over a short time period.
- Conventional radiography, **US** and **CT** are frequently used in the diagnosis.

NONTRAUMATIC ABDOMINAL EMERGENCIES

Natural history of frequent causes of an acute abdomen

Life-threatening

Aortic aneurysm rupture
Pancreatitis
Bowel ischemia
Perforated peptic ulcer
Perforated diverticulitis



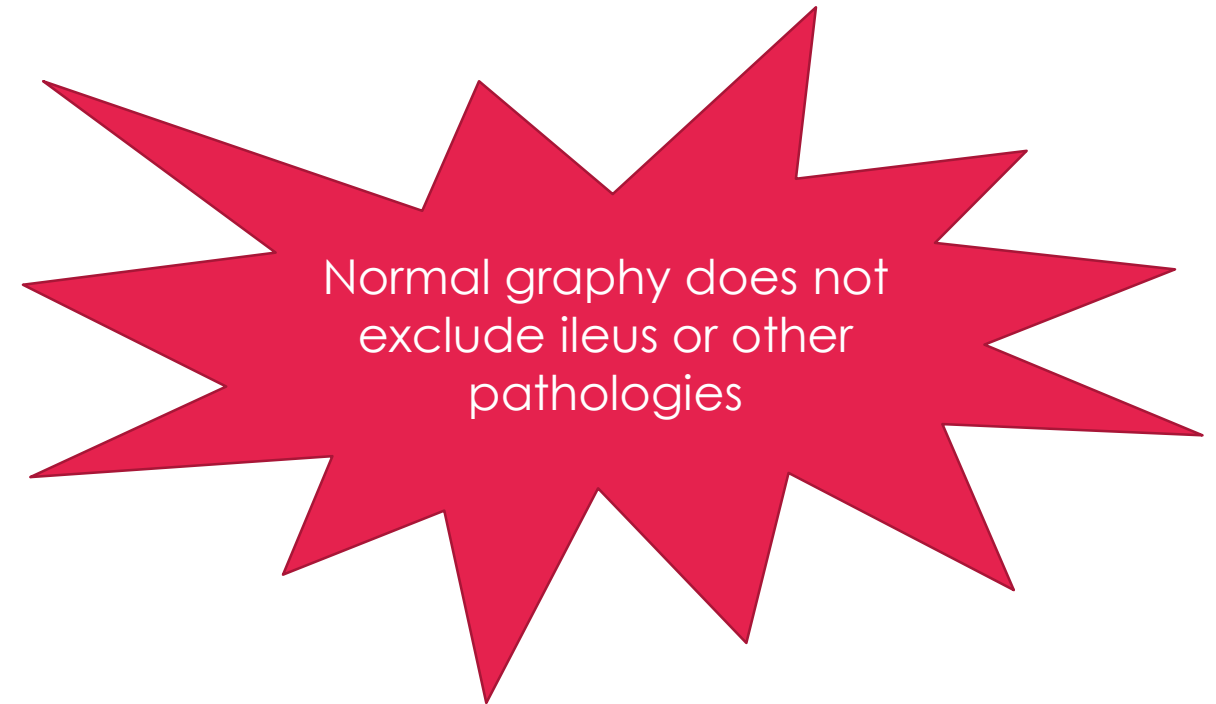
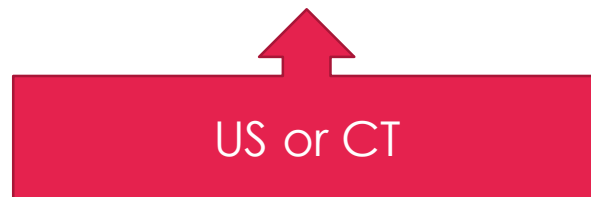
Self-limiting

Appendicitis
Cholecystitis
Sigmoid diverticulitis
Salpingitis
Gastroenteritis
Lymphadenitis
Epiploic appendagitis
Omental infarction
Cecal diverticulitis

- Acute abdominal pain can represent a spectrum of conditions from benign and self-limited disease to life threatening conditions.

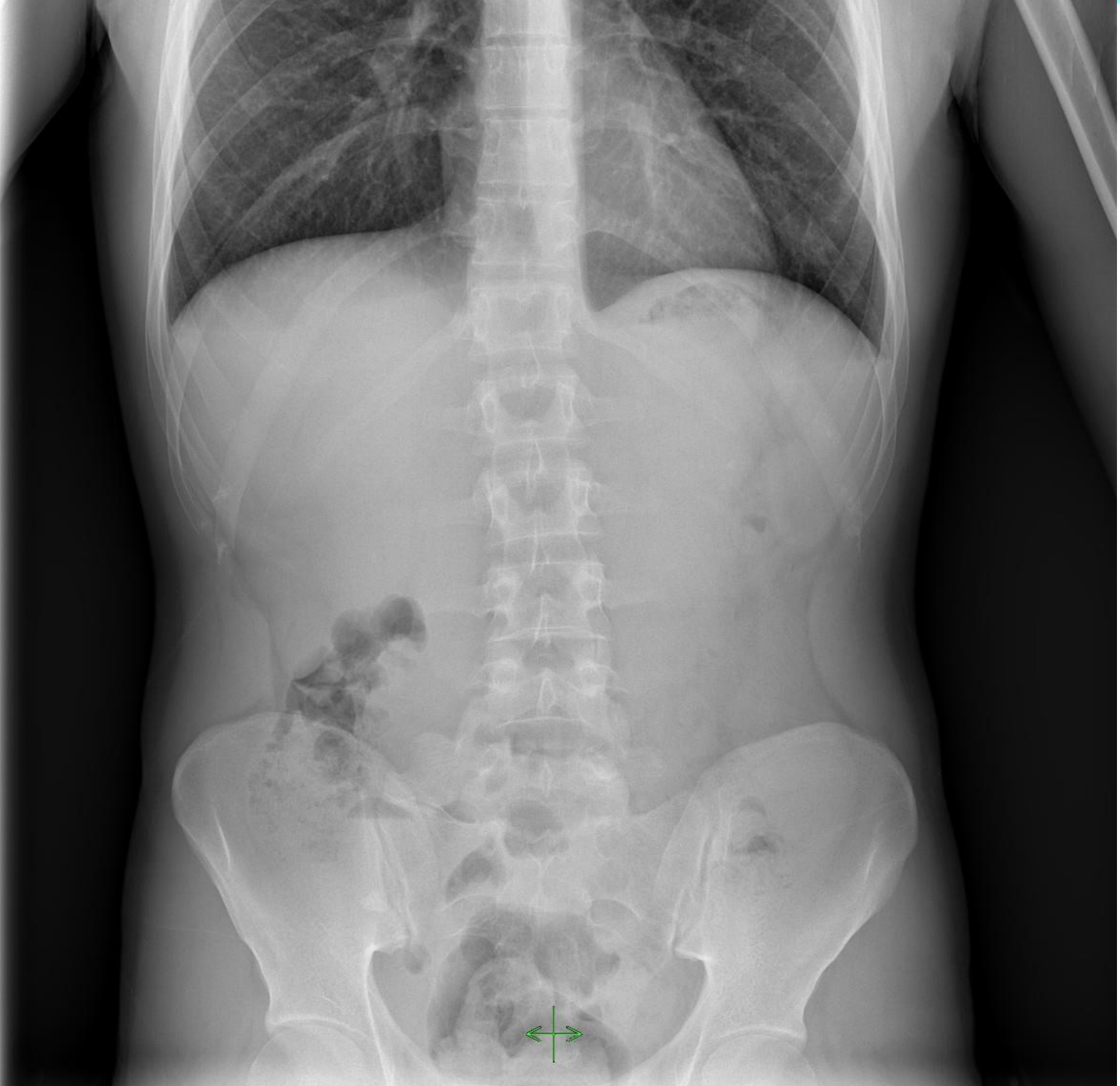
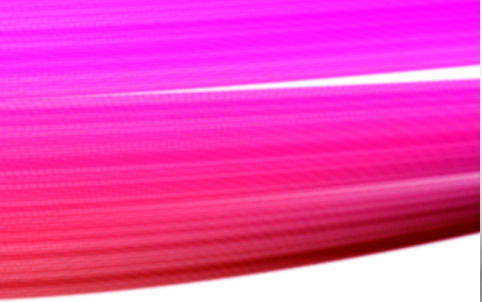
NONTRAUMATIC ABDOMINAL EMERGENCIES

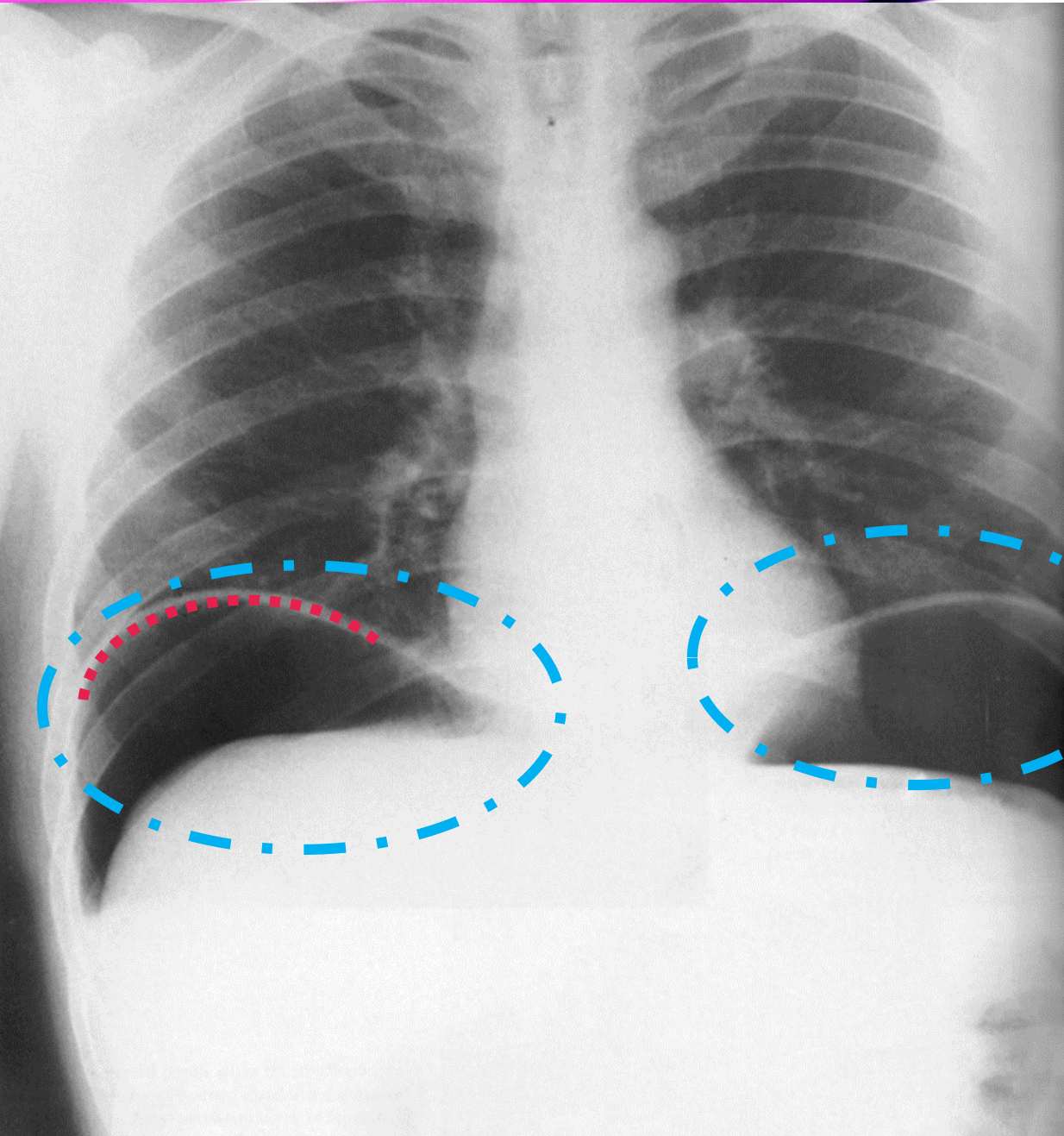
- The initial radiological evaluation often consists of plain abdominal radiography
- Plain abdominal graphy shows
 - bowel obstruction/ileus
 - pneumoperitoneum
 - urethral stones/calculi



PNEUMOPERITONEUM

- Air in the peritoneal cavity
- perforation from the gastrointestinal tract
 - peptic ulcer disease
 - ischemic bowel
 - bowel obstruction
 - necrotizing enterocolitis
 - appendicitis
 - diverticulitis
 - malignancy
 - inflammatory bowel disease
 - mechanical perforation
 - trauma
 - Colonoscopy
 - foreign bodies
 - iatrogenic
- postoperative free intraperitoneal gas

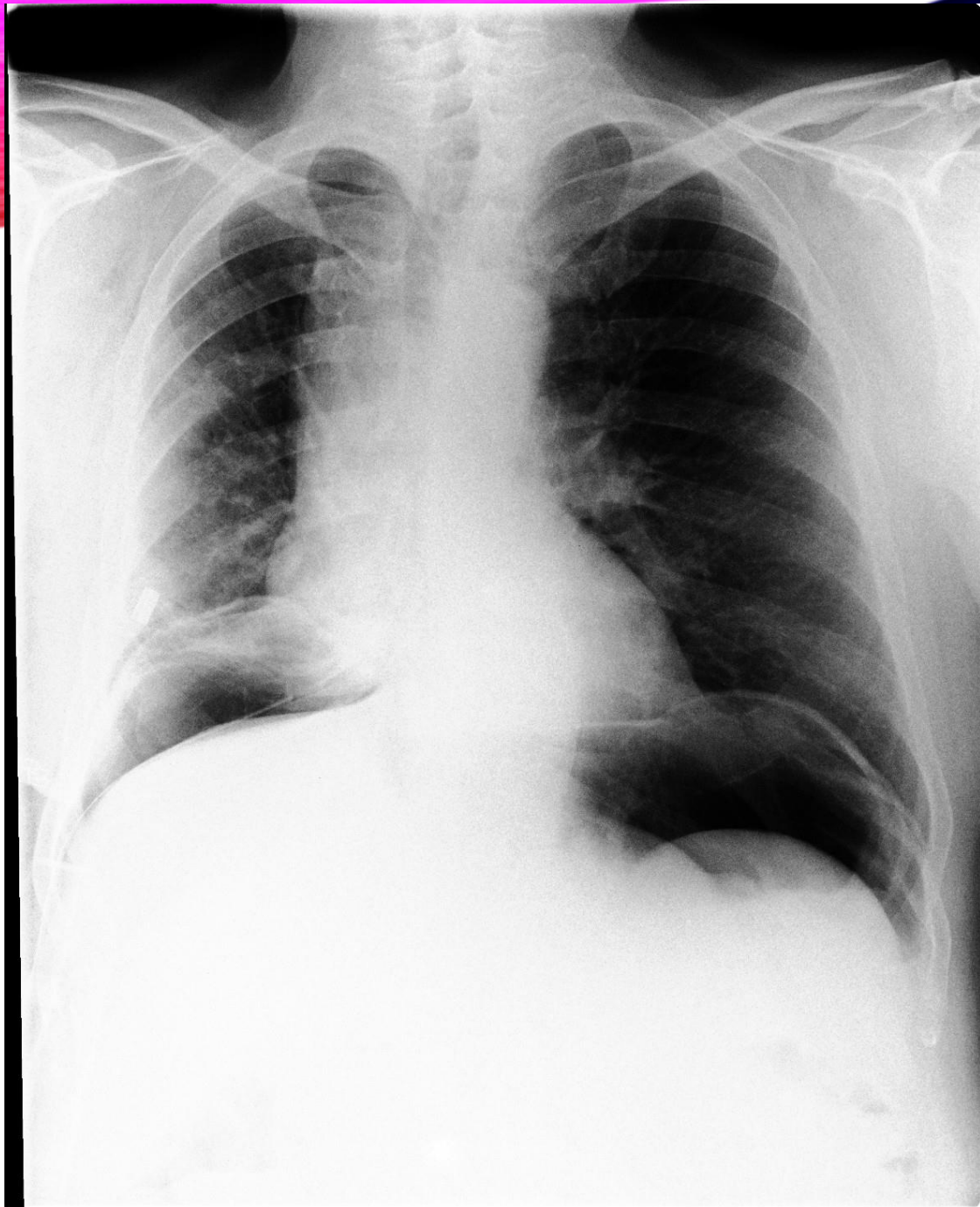




PNEUMOPERITONEUM

43 years old, male, acute
epigastric pain

Next
imaging
modality
CT
with IV and
oral
contrast
agent



PNEUMOPERITONEUM

BOWEL OBSTRUCTION

55 y, female, history of oophorectomy 2 years ago



- Mechanical intestinal obstruction
- Centrally located multiple dilated loops of gas filled bowel
- Valvulae conniventes (arrow) are visible - confirming this is **small bowel**

Most common etiology: **fibrous adhesions**

Next imaging modality: **CT**

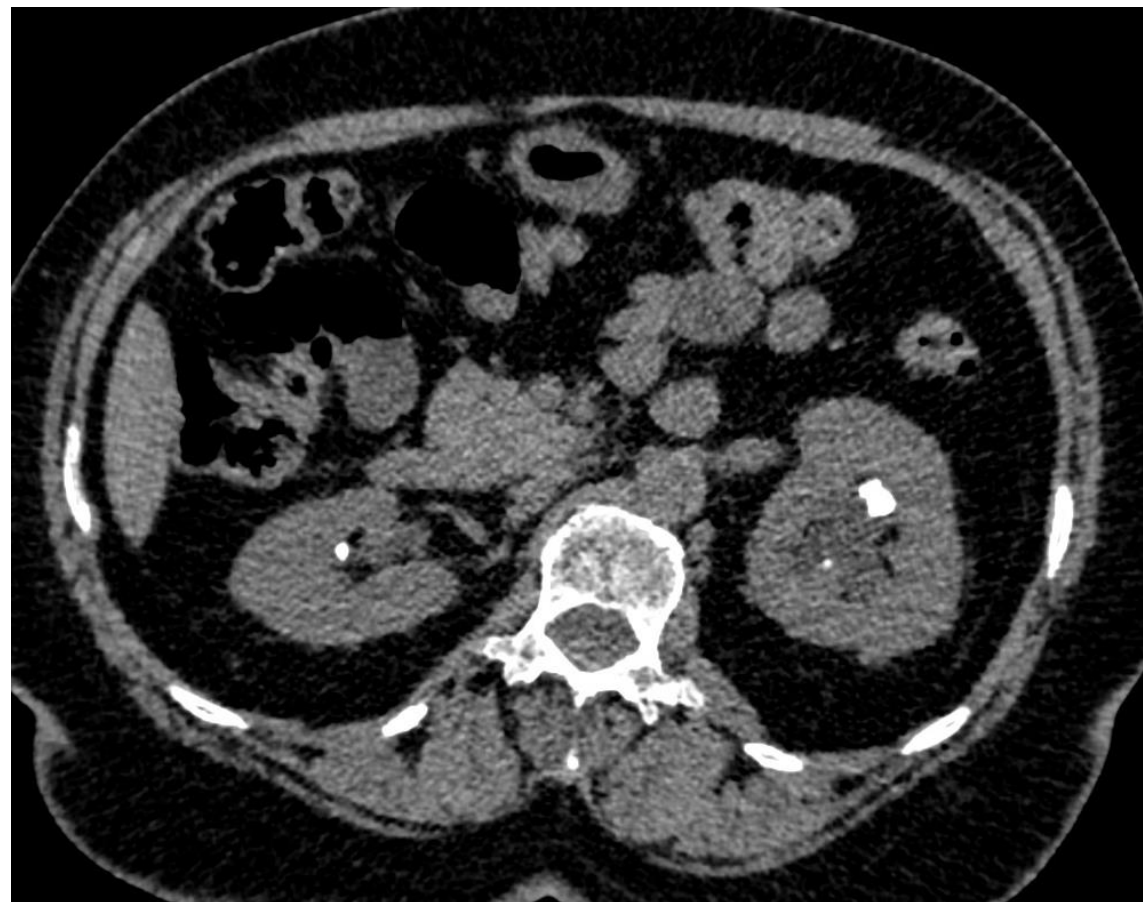
diagnosis of exclusion as adhesive bands are not seen on CT

URETERAL STONES/UROLITHIASIS



- **calcium oxalate +/- calcium phosphate: ~75%**
- **struvite (triple phosphate): 15%**
- **pure calcium phosphate: 5-7%**
- uric acid: 5-8%
- cystine: 1%
- lithogenic medications: 1%
- **% 85-90 radiopaque**

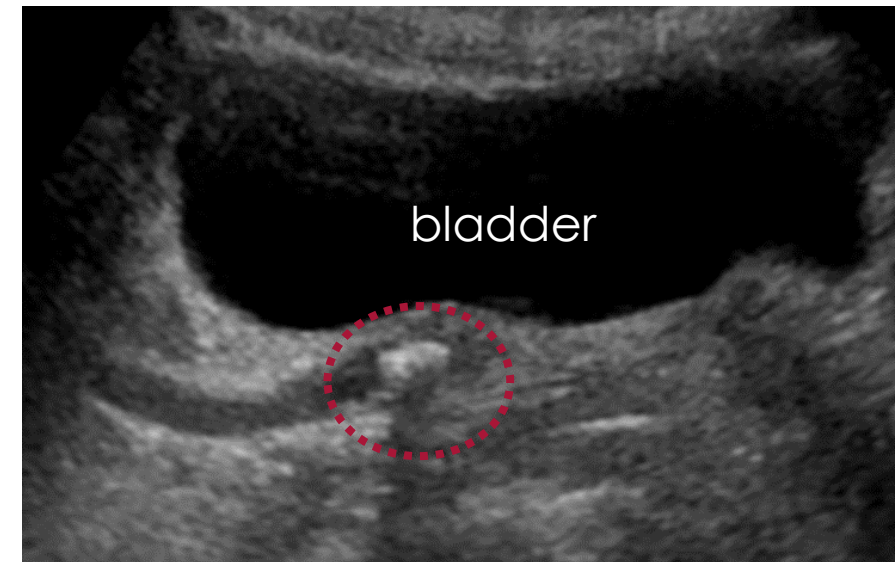
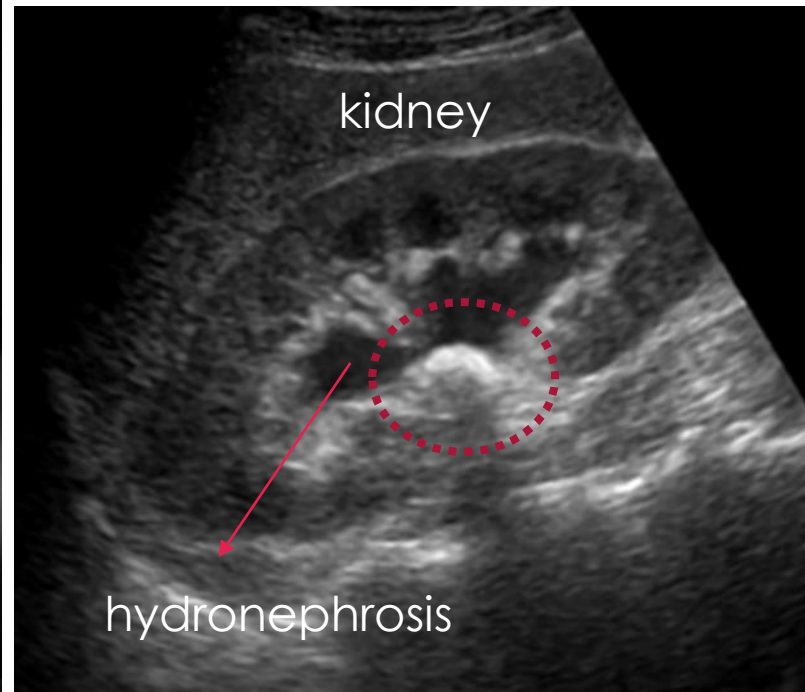
URETERAL STONES/UROLITHIASIS



URETERAL STONES/UROLITHIASIS

38 y, female, RUQ pain, hematuria

- Abdominal (AP) x-ray : normal
 - Then US is the next imaging modality
 - If US N, CT (without IV contrast)



LOCATION OF PAIN DETERMINES STRATEGY!!!

- Confirm or exclude the most common disease!!!!

Pain in
RUQ

Look for
Cholecystitis

Pain in
RLQ

Look for
Appendicitis

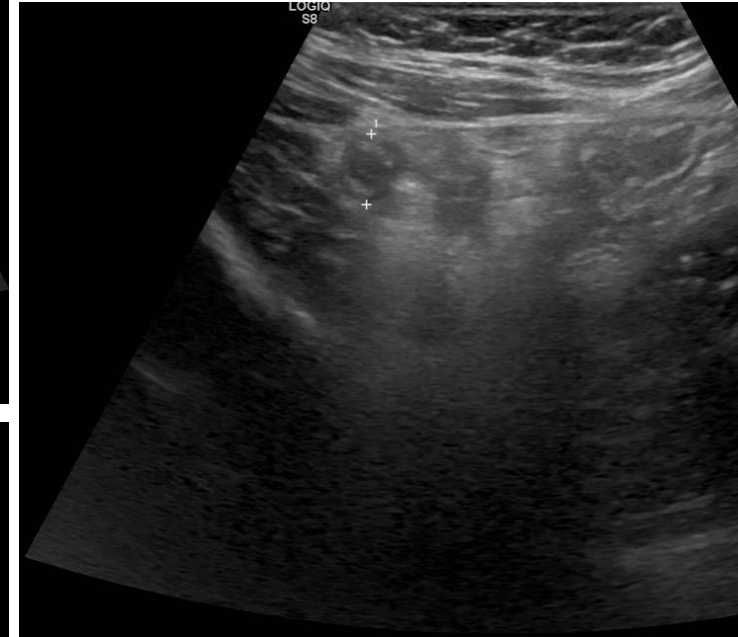
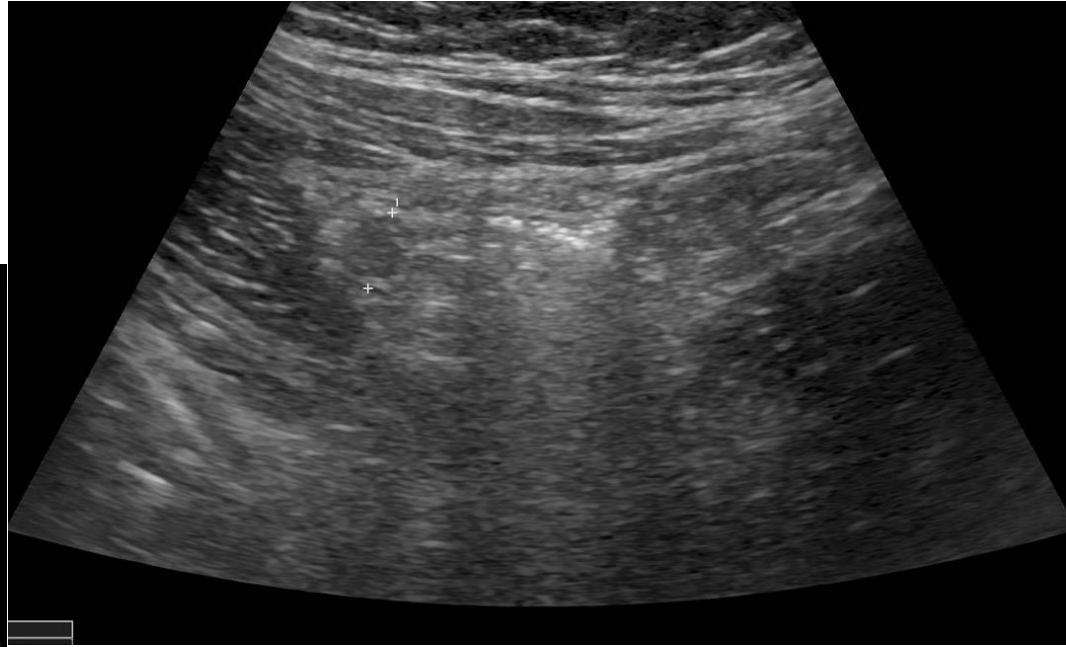
Pain in
LLQ

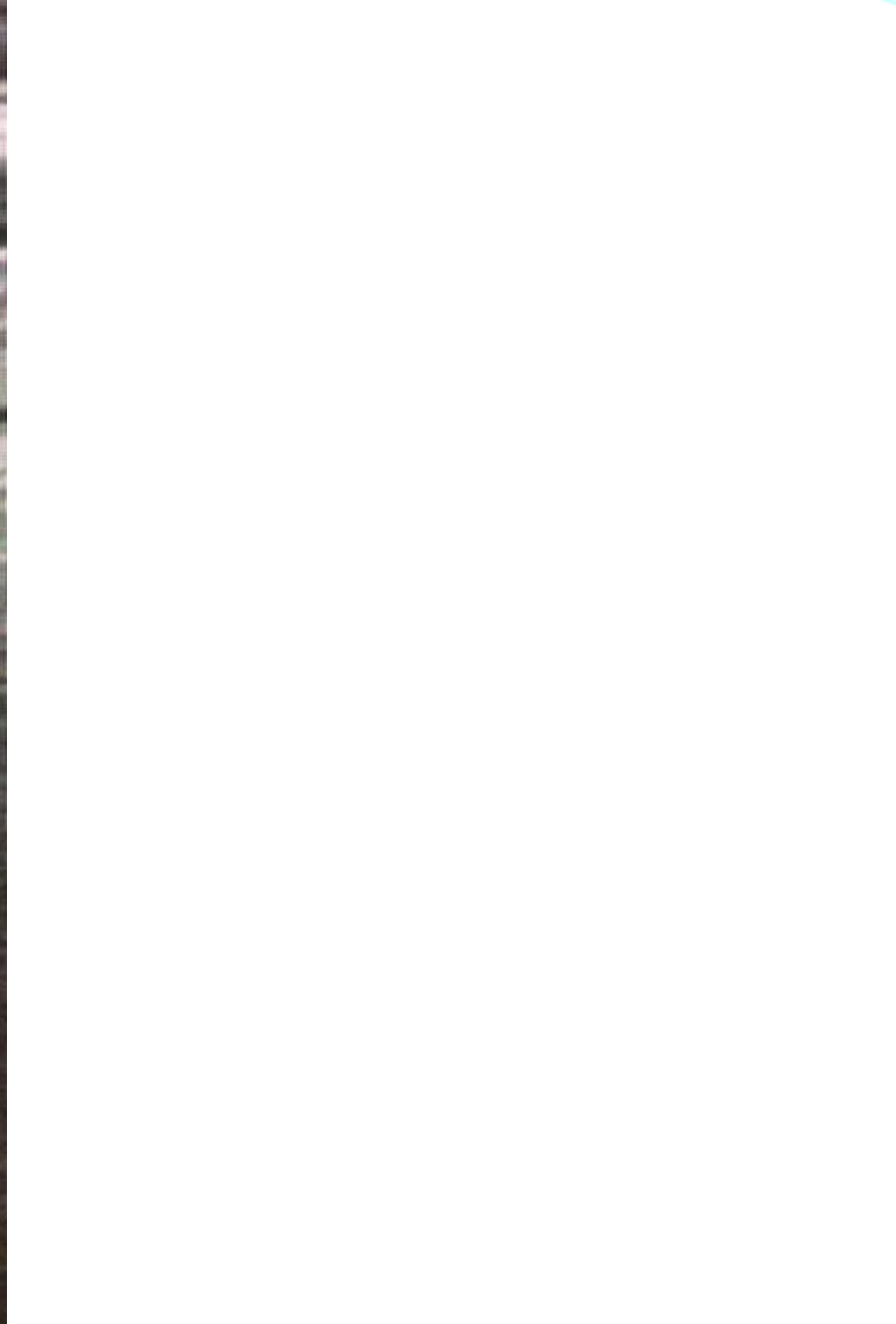
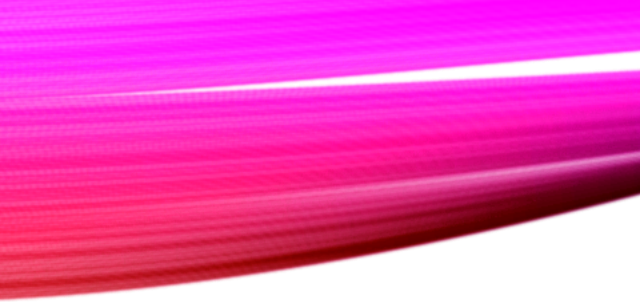
Look for
**Sigmoid
Diverticulitis**

APPENDICITIS

- Primary imaging modality **Ultrasound**
- On Sonography and CT the appendix is seen as a blind-ending nonperistaltic tubular structure arising from the base of the cecum
- outer-to-outer diameter of the appendix → important imaging criterium.
- SIGNS:
 - Diameter >6 mm
 - Fecolith
 - Periappendicial inflamated fat tissue

APPENDICITIS





CHOLECYSTITIS

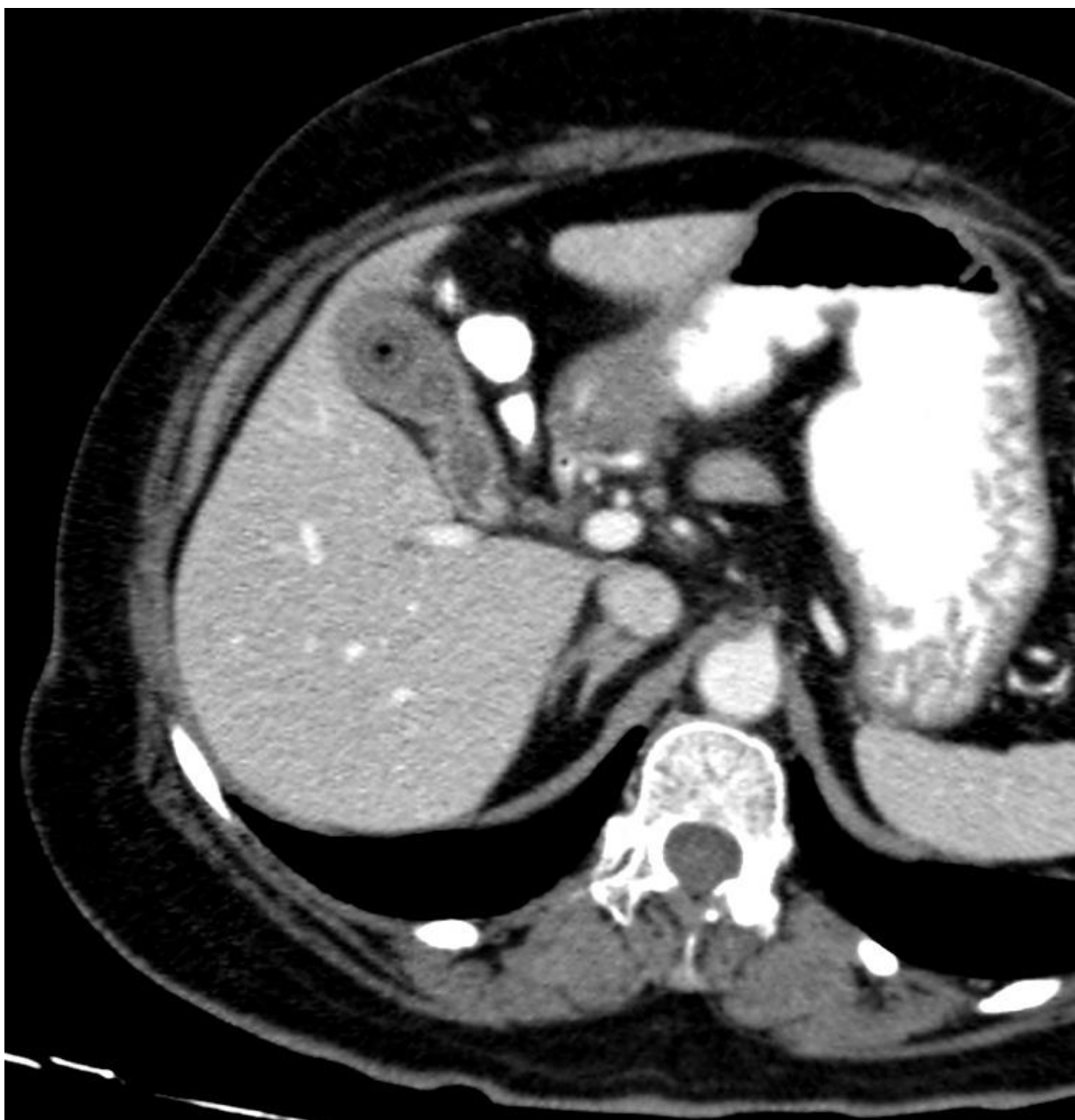
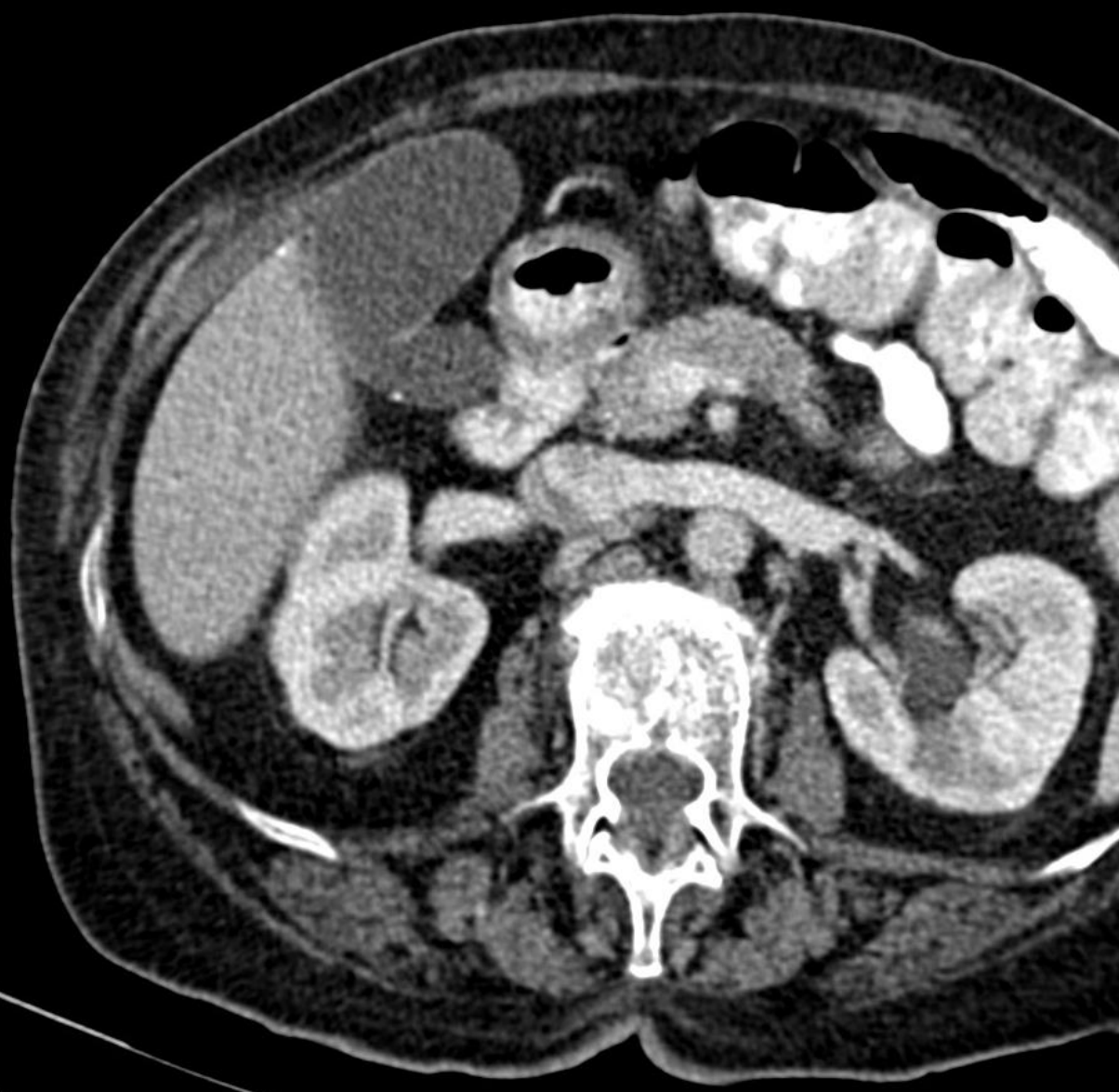
- Primary imaging modality **Ultrasound**
- Findings:
 - enlarged hydropic gallbladder
 - thickened wall
 - stones, sludge





BP: 449.4

R



CHOLECYSTITIS



WHEN CT?

- If it is complicated
TOMOGRAPHY



USE CONTRAST ENHANCED

