Best Imaging Test: Abdomen

Objective:

Discuss most appropriate initial imaging for abdominal pain.

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DALHOUSIE UNIVERSITY
Inspiring Minds

Imaging Modalities

- CT
- Ultrasound

- MRI
- Fluoroscopy
- Abdominal radiography

Characteristics of Pain

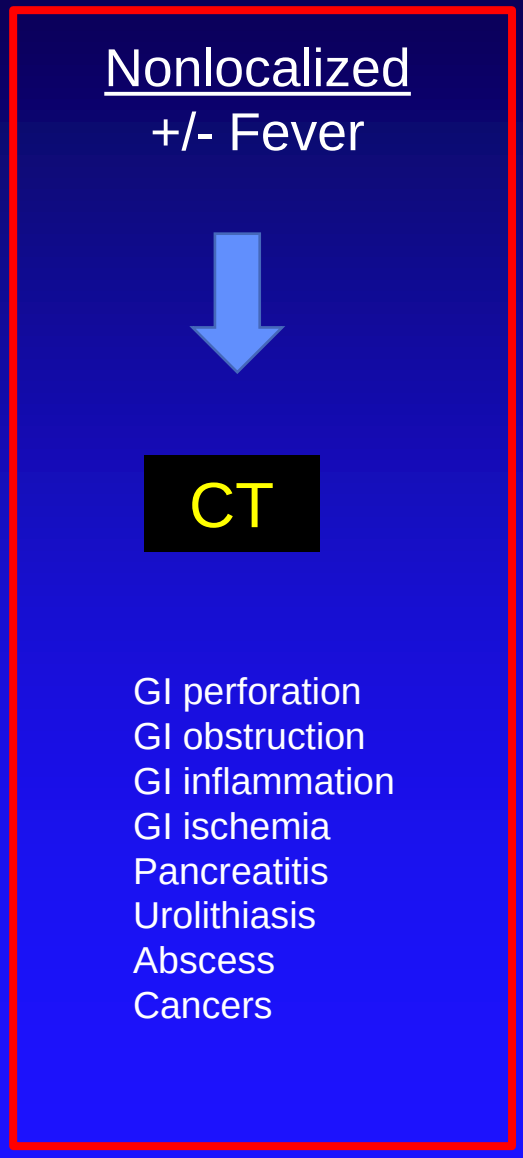
- Localized vs Nonlocalized
- Acute vs Chronic
- Fever, weight loss, anemia

- Surgical history
- Malignancy or other illness
- Pertinent laboratory results
- Family history

Information on requisition guides:

- Best modality
- Urgency
- Interpretation

Initial Imaging Pathways



Nonlocalized
+/- Fever

CT

GI perforation
GI obstruction
GI inflammation
GI ischemia
Pancreatitis
Urolithiasis
Abscess
Cancers

Localized
to Lower Quadrants

CT or US

Diverticulitis: CT
Appendicitis: CT/US
Crohn's: CT/CTE

Localized
to RUQ

US

Biliary Disease

ACR Appropriateness Criteria

The ACR Appropriateness Criteria® (AC) are evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for a specific clinical condition. Employing these guidelines helps providers enhance quality of care and contribute to the most efficacious use of radiology. Learn more »

The newest ACR AC are listed below.

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The newest ACR AC are listed below.

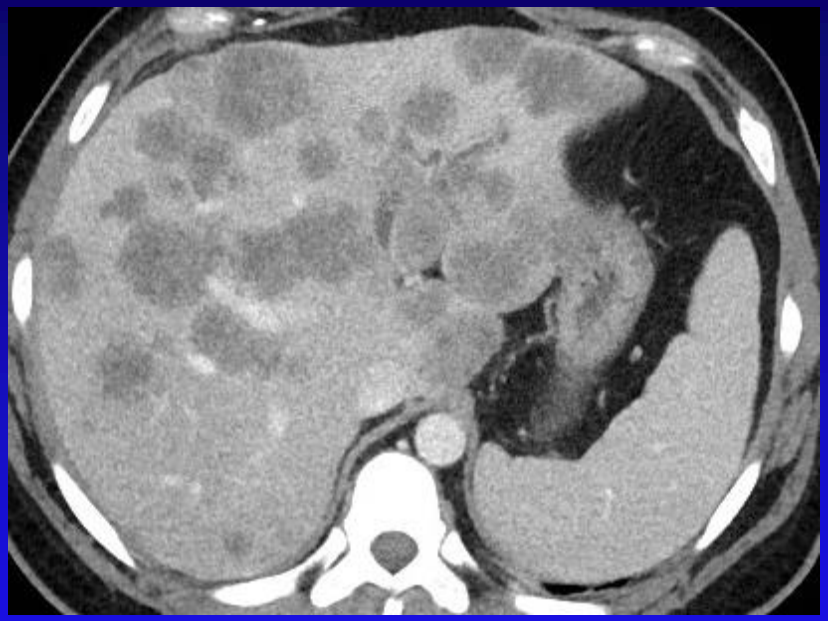
Nonlocalized pain +/- fever

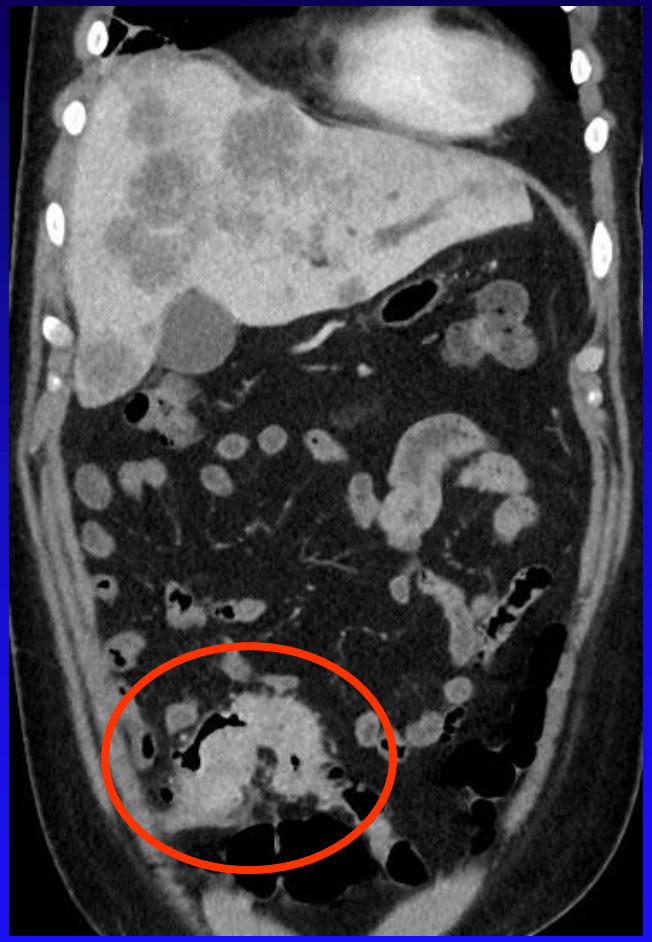
CT is *usually* the most appropriate initial test

- Abdominal pain with fever
- Abdominal pain with fever and postoperative
- Abdominal pain with neutropenia
- Abdominal pain not otherwise specified

US might be appropriate as initial test

Case





43 y.o male with 3 month history of abdominal pain.

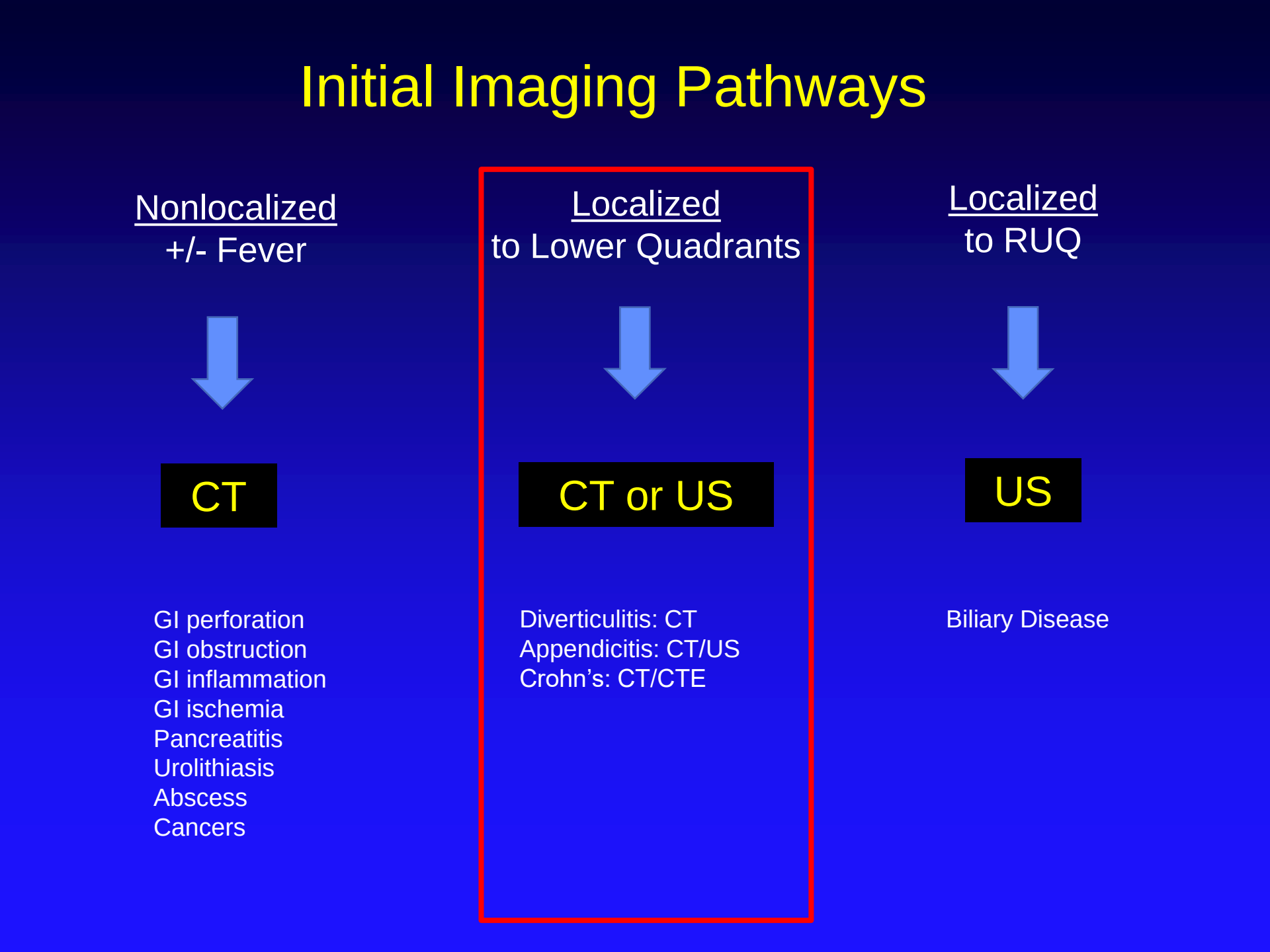
Contrast

Intravenous contrast most optimal

Oral vs no oral contrast

- Depends on indication
- Can aid in evaluation of bowel- perforation
- Can delay diagnosis and workflow

Initial Imaging Pathways



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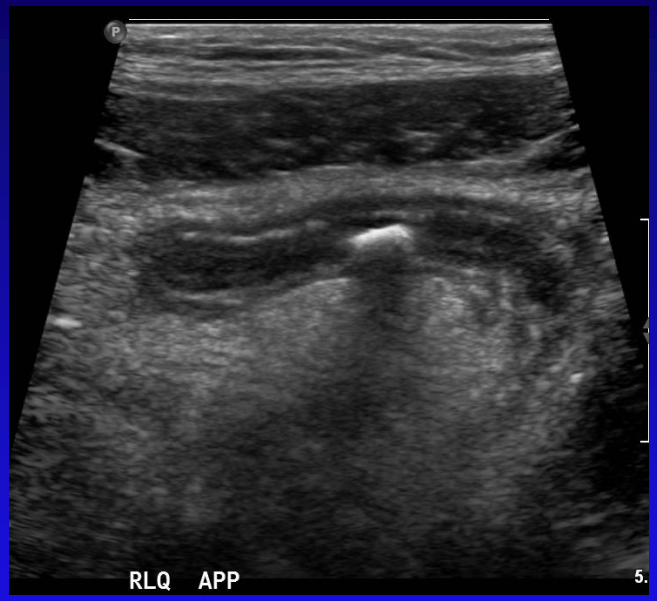
Localized RLQ or LLQ Pain

CT *usually* most appropriate initial test for RLQ or LLQ pain (esp. with fever &/or leukocytosis)

US might be appropriate

- Age, sex (female and pelvic pathology suspected), body habitus, local experience

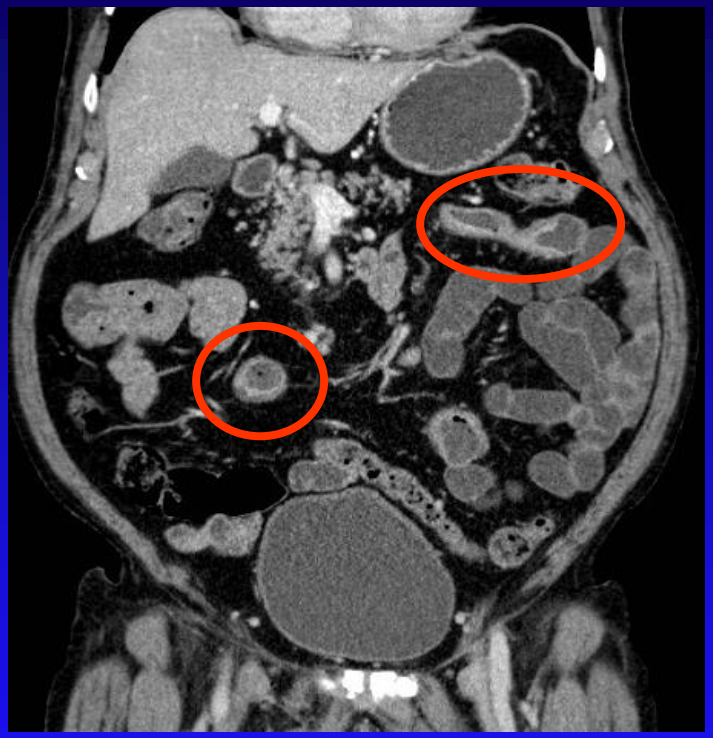
Case Illustration - Appendicitis



Ultrasound

25 year old male with 12 hours of periumbilical pain. No fever.

Another Case – Crohn's Disease



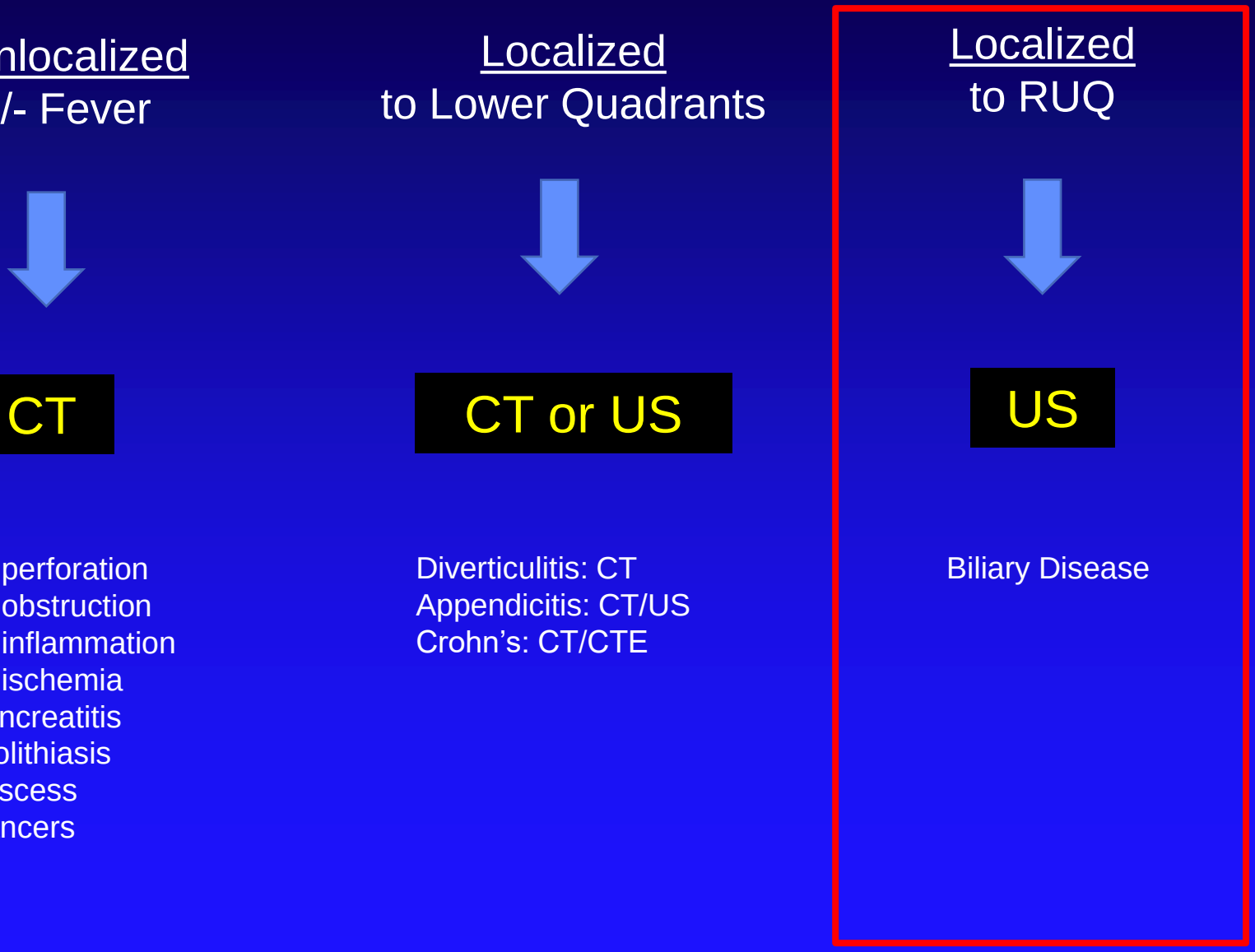
CT Enterography

36 year old male with recurrent RLQ pain.

CT Enterography Or MR Enterography

- Optimally assess bowel wall
- Administration Of Oral Agent To Distend Small Bowel (1750ml Sorbitol/Water Over 1hour)
- CT Imaged in Enterographic phase of enhancement
- CTE often First Imaging Test in all adult patients
- MRI in younger patients, or for follow-up or as needed clinically (eg. stricture)

Initial Imaging Pathways



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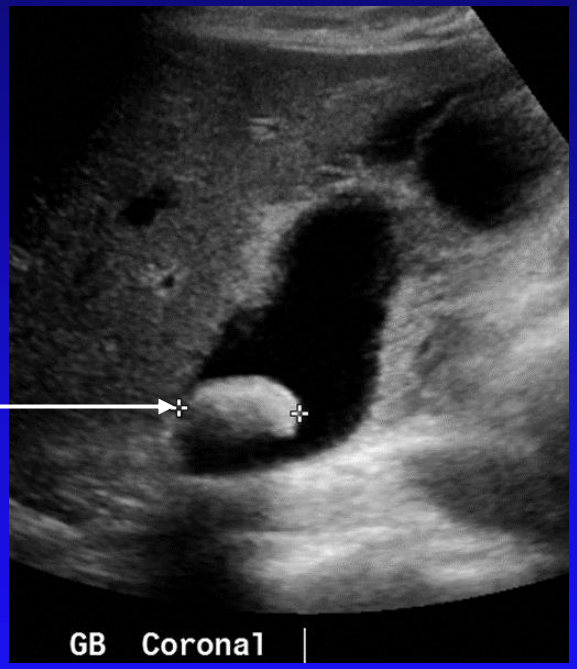
Localized RUQ Pain

US is the first choice of investigation for biliary symptoms or right upper quadrant abdominal pain.

Case
RUQ Pain, Suspect Cholecystitis

Gallstone



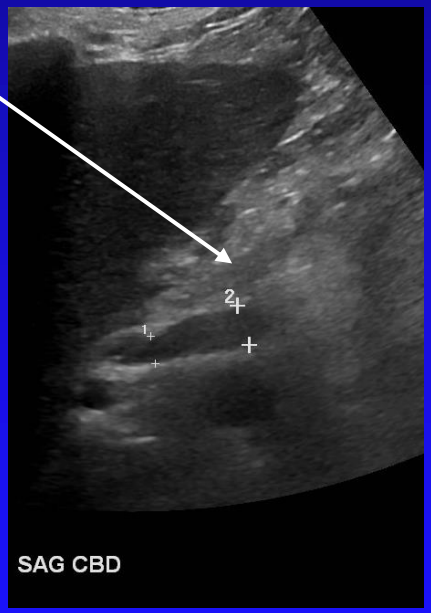
Mural thickening
+ edema
= Cholecystitis

Ultrasound

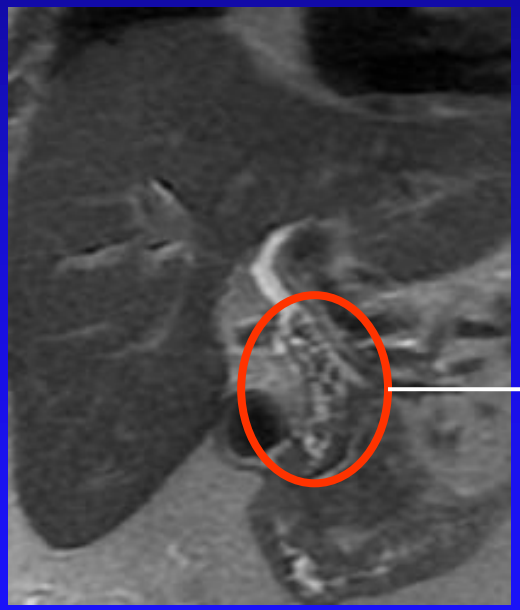
Another Case
RUQ Pain, Suspect Choledocholithiasis

CT or MRI might be appropriate, esp. in equivocal ultrasound

CBD: obscured distally by bowel gas



Ultrasound



Multiple stones obstructing CBD

MRI

Summary: Initial Imaging Pathways

Nonlocalized +/- Fever	Localized to Lower Quadrants	Localized to RUQ
CT	CT or US	US
GI perforation GI obstruction GI inflammation GI ischemia Pancreatitis Urolithiasis Abscess Cancers	Diverticulitis: CT Appendicitis: CT/US Crohn's: CT/CTE	Biliary Disease

Practical Points

Requisitions are triaged: The information which you provide might be more important than choosing the right test

Provide level of urgency on requisitions

Resources and References

- https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria
- https://car.ca/
- https://www.radiologyinfo.org
- https://choosingwiselycanada.org/recommendation/radiology/

Causes of Abdominal Pain

- GI Inflammation, Perforation, Obstruction, Ischemia
- Hepatobiliary Disease
- Pancreatic Processes
- Nephrolithiasis
- Pelvis processes
- Abscess
- Malignancy

Ultrasound and Biliary Disease

- Usually first imaging modality used in the setting of suspected biliary disease ie. cholelithiasis and acute cholecystitis
- Often first imaging modality in suspected biliary obstruction
- Limitations due to bowel gas, body habitus, fatty liver
- Result in suboptimal visualization of common bile duct, especially distally as well as the pancreas

RUQ pain – Etiology Unknown

- US or CT usually appropriate as initial imaging test
- MRI might be appropriate

Diverticulitis

American College of Radiology
ACR Appropriateness Criteria®
Acute Nonlocalized Abdominal Pain

Variant 1: **Acute nonlocalized abdominal pain and fever. No recent surgery. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
US abdomen	May Be Appropriate	O
CT abdomen and pelvis without IV contrast	May Be Appropriate	☢☢☢
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
Radiography abdomen	May Be Appropriate	☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢
WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Nuclear medicine scan gallbladder	Usually Not Appropriate	☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢
Fluoroscopy upper GI series with small bowel follow-through	Usually Not Appropriate	☢☢☢

American College of Radiology
ACR Appropriateness Criteria®
Right Lower Quadrant Pain

Variant 1: **Right lower quadrant pain. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
US abdomen	May Be Appropriate	O
US pelvis	May Be Appropriate	O
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
CT abdomen and pelvis without IV contrast	May Be Appropriate	☢☢☢
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	☢☢☢☢
WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢