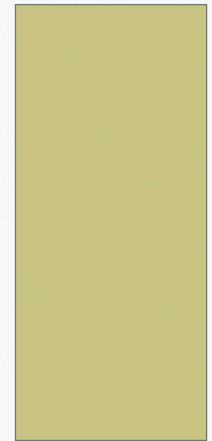




RADIOGRAPHIC APPEARANCES OF GALLBLADDER CARCINOMA

MOLLY S. BRET, HARVARD MEDICAL SCHOOL YEAR III
GILLIAN LIEBERMAN, MD





OUR PATIENT: PRESENTATION

- CC: Otherwise healthy 77 year old female with painless jaundice
- HPI:
 - PCP noted jaundice at a regular appointment.
- ROS:
 - Positive for pruritus, unintentional 10 lb. weight loss.
 - Negative for chest pain, abdominal pain, n/v, change in bowel habits, abdominal distention, edema.

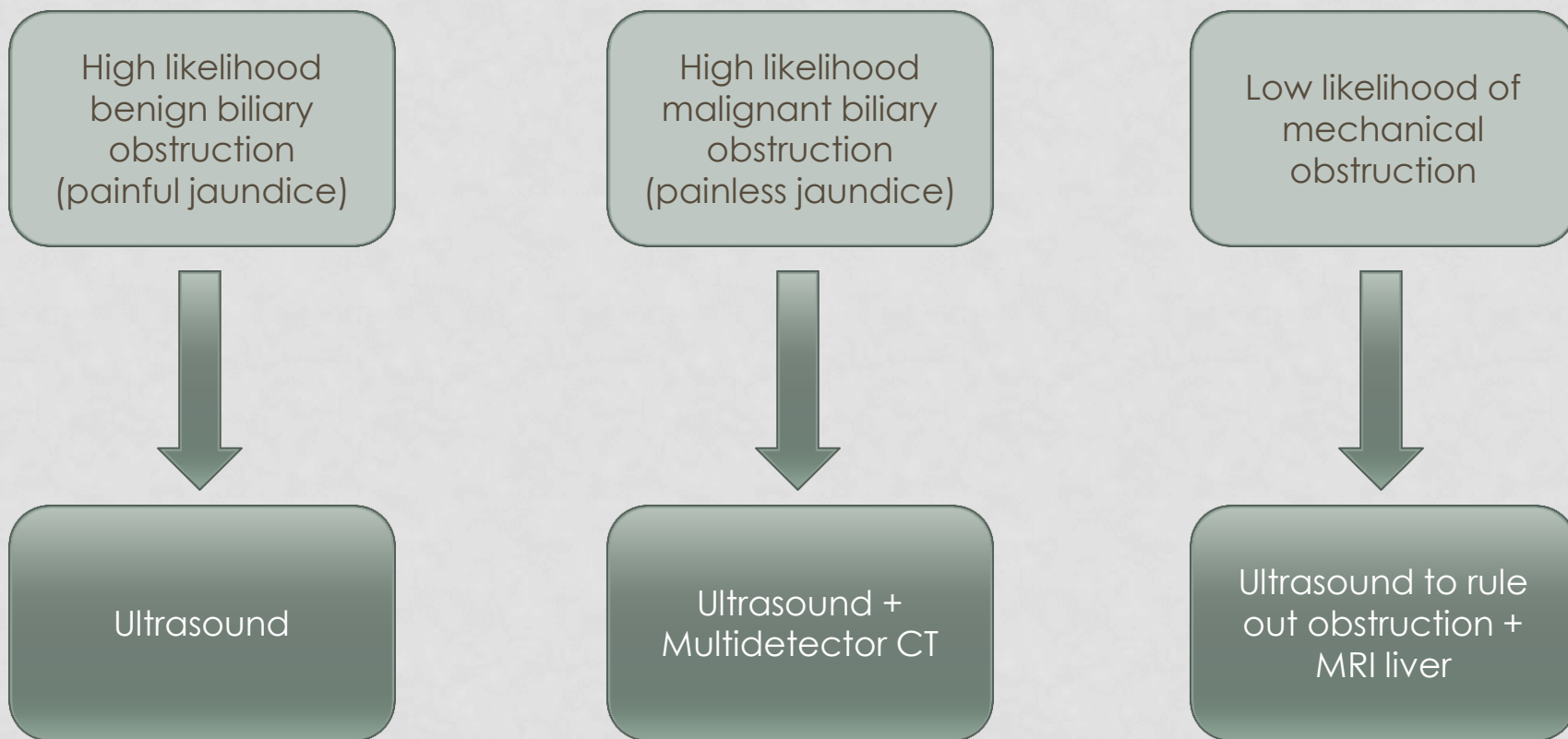


OUR PATIENT: HISTORY AND LAB FINDINGS

- PMH: none.
- Previous medications: multivitamin.
- SH: Lives with husband, remote smoking history, no EtOH. Exercises regularly.
- PE: VS stable. Scleral icterus and skin jaundice, otherwise normal.
- Key labs:
 - Bilirubin (total) = 14.2, bilirubin (direct) = 9.4
 - ALT: 293 AST: 182 Alk Phos: 1098

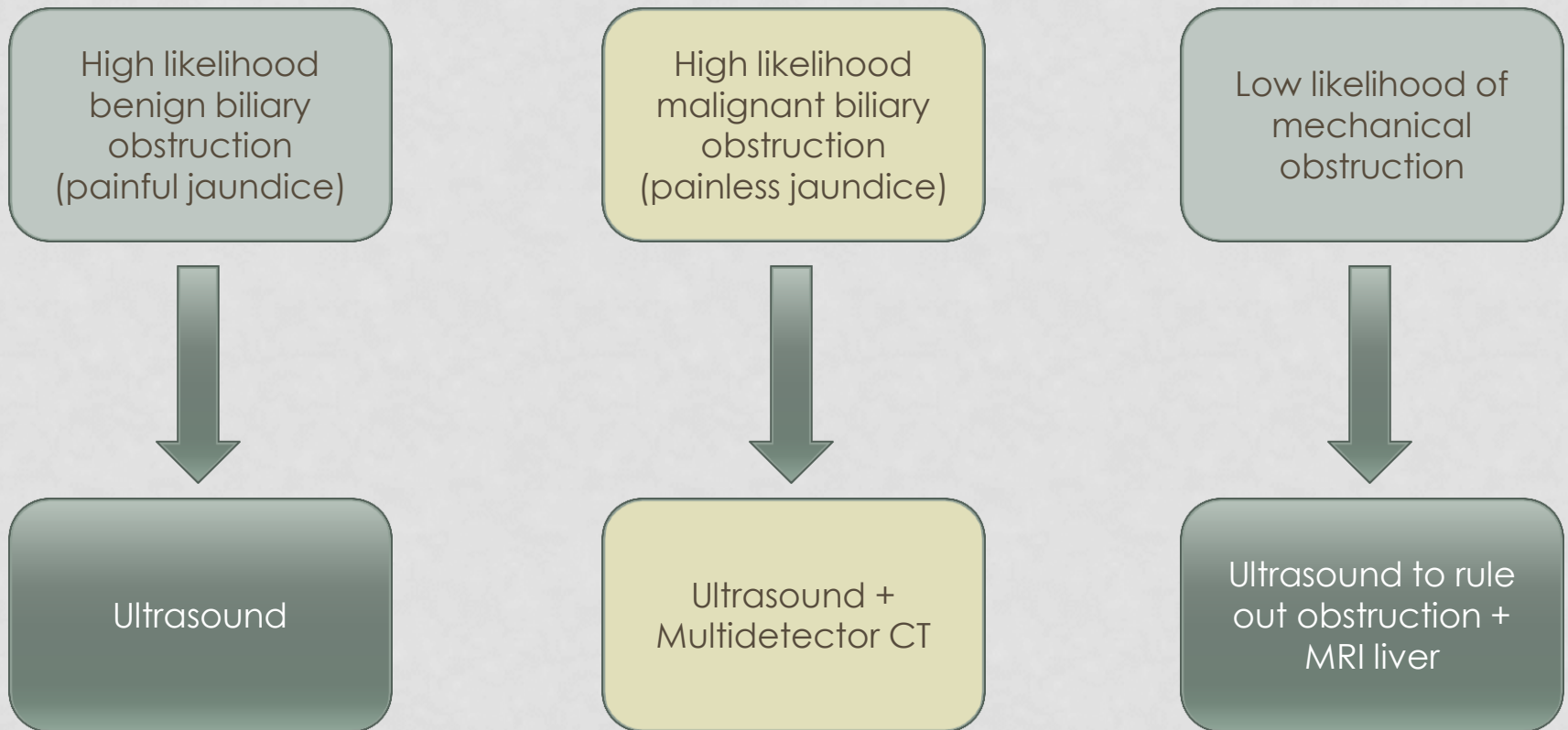


INITIAL ASSESSMENT OF JAUNDICE: ACR APPROPRIATENESS CRITERIA



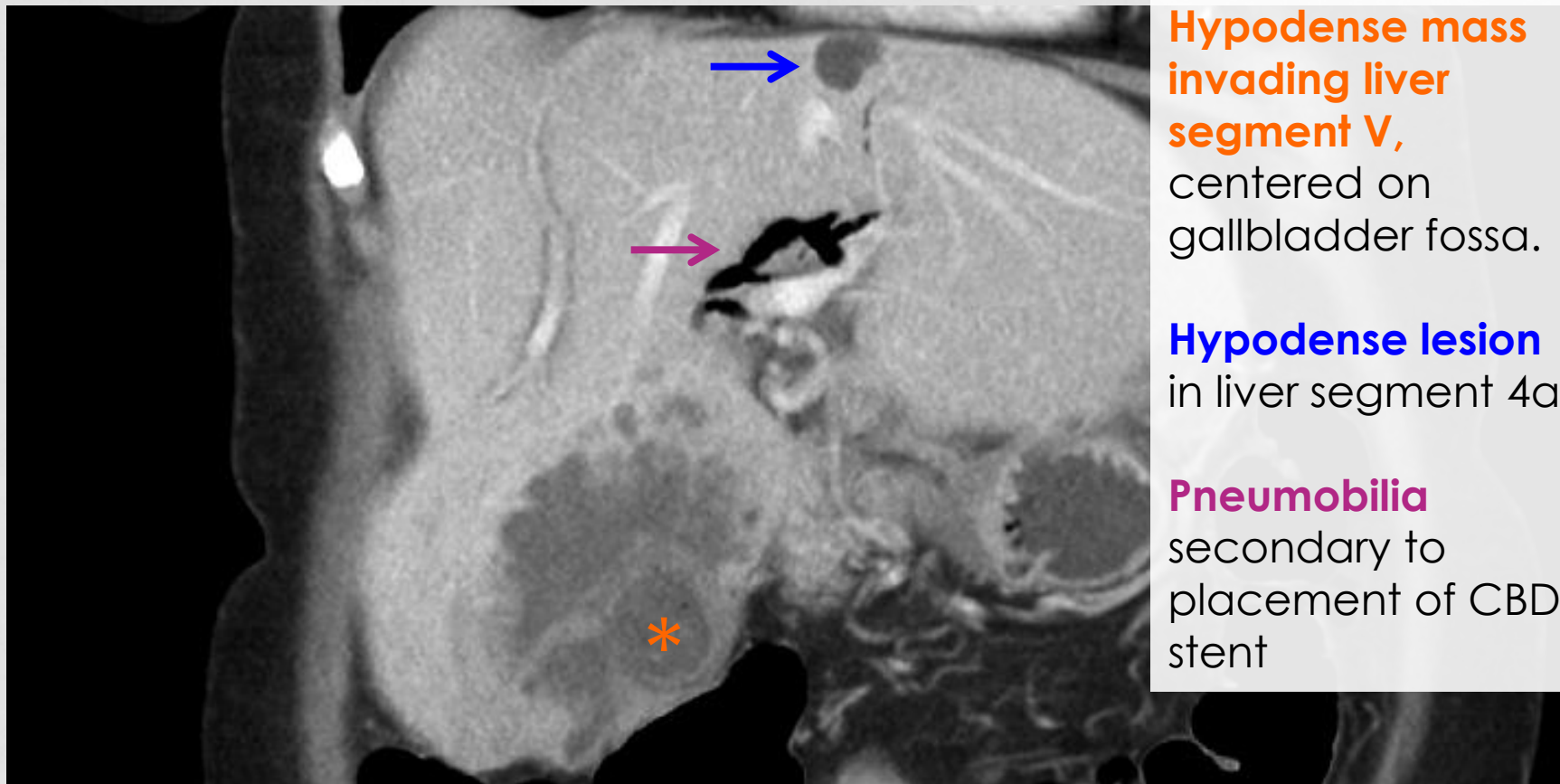


INITIAL ASSESSMENT OF JAUNDICE: ACR APPROPRIATENESS CRITERIA





OUR PATIENT: GALLBLADDER MASS ON CT



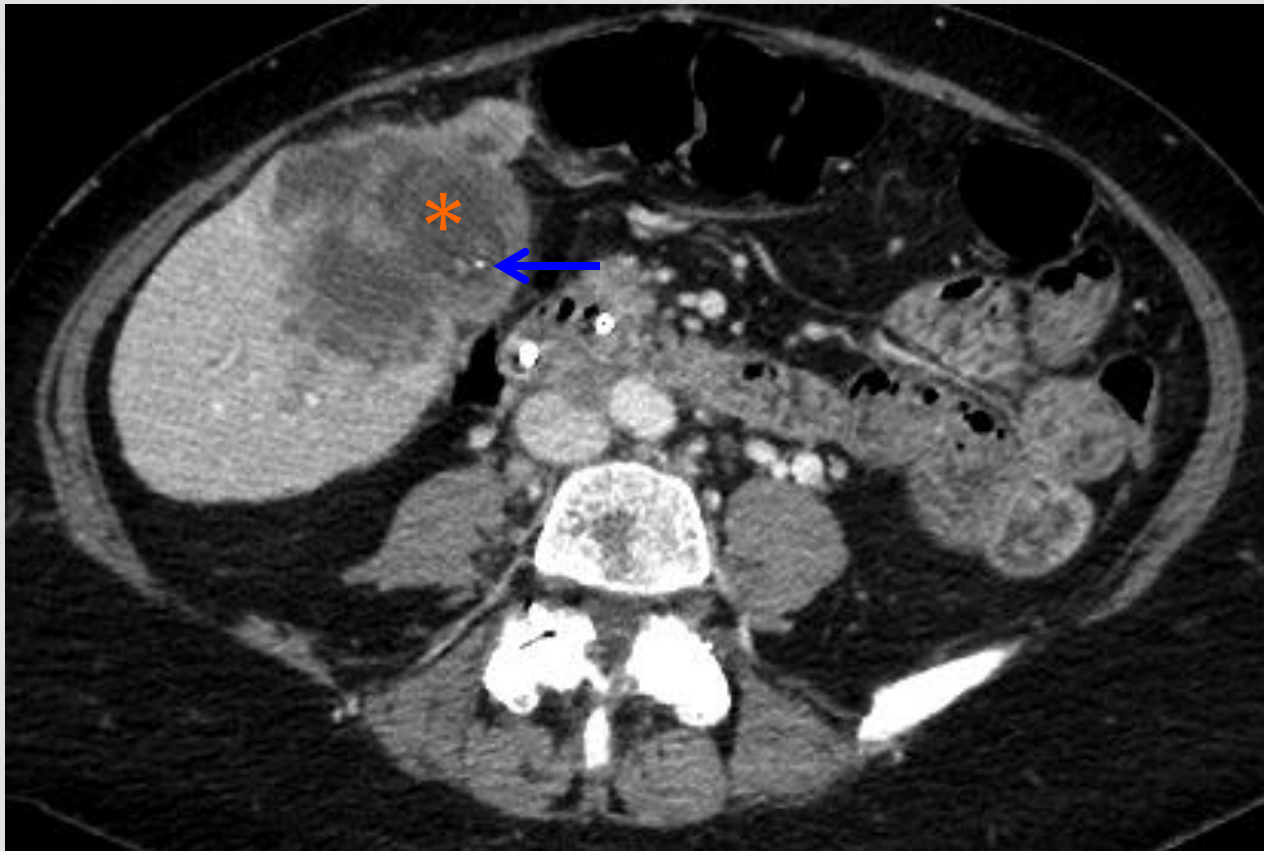
Hypodense mass
invading liver
segment V,
centered on
gallbladder fossa.

Hypodense lesion
in liver segment 4a

Pneumobilia
secondary to
placement of CBD
stent

Coronal view, C+ CT, portal venous phase

OUR PATIENT: GALLBLADDER MASS AND GALLSTONES ON CT



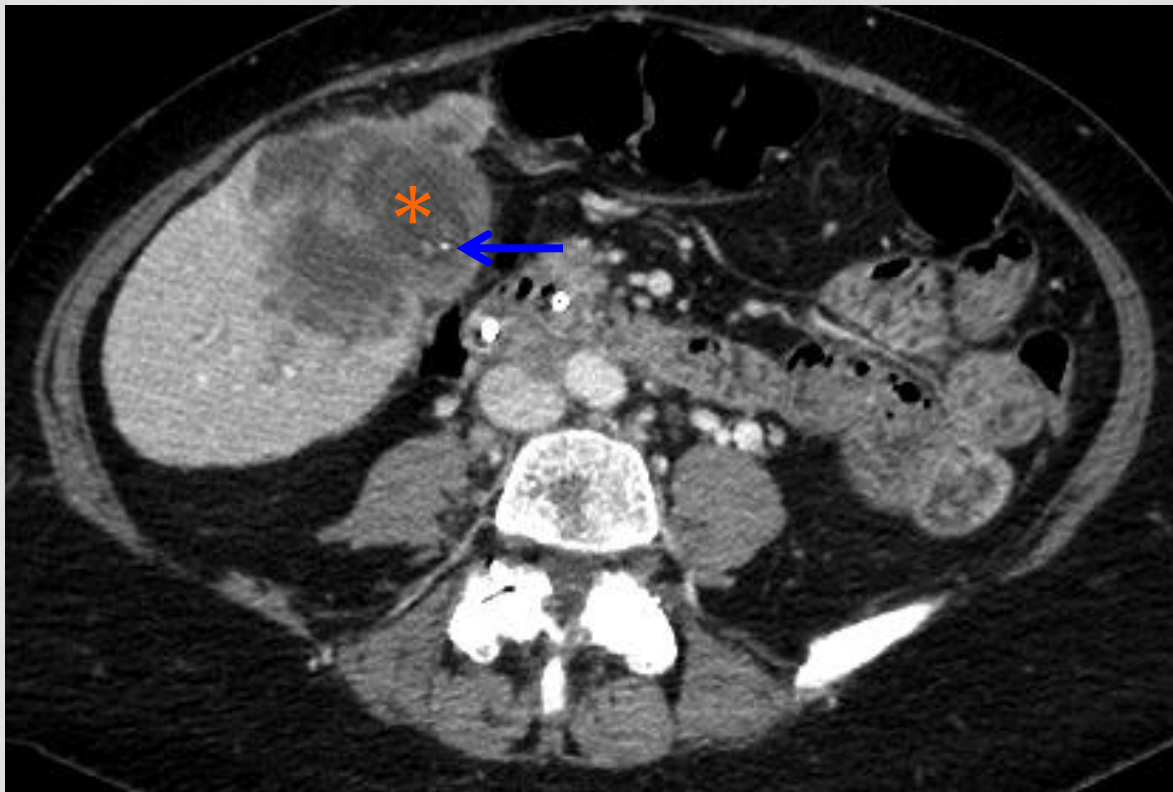
Gallstone in
gallbladder fossa.

Hypodense mass
filling **gallbladder**
lumen and
invading
surrounding liver.

Axial view, C+ CT abdomen,
portal venous phase

PACS, BIDMC

DIFFERENTIAL DIAGNOSIS: MASS REPLACING GALLBLADDER LUMEN



Differential diagnosis:

Benign polypoid lesions

Angiomyomatosis

Pseudotumorous sludge

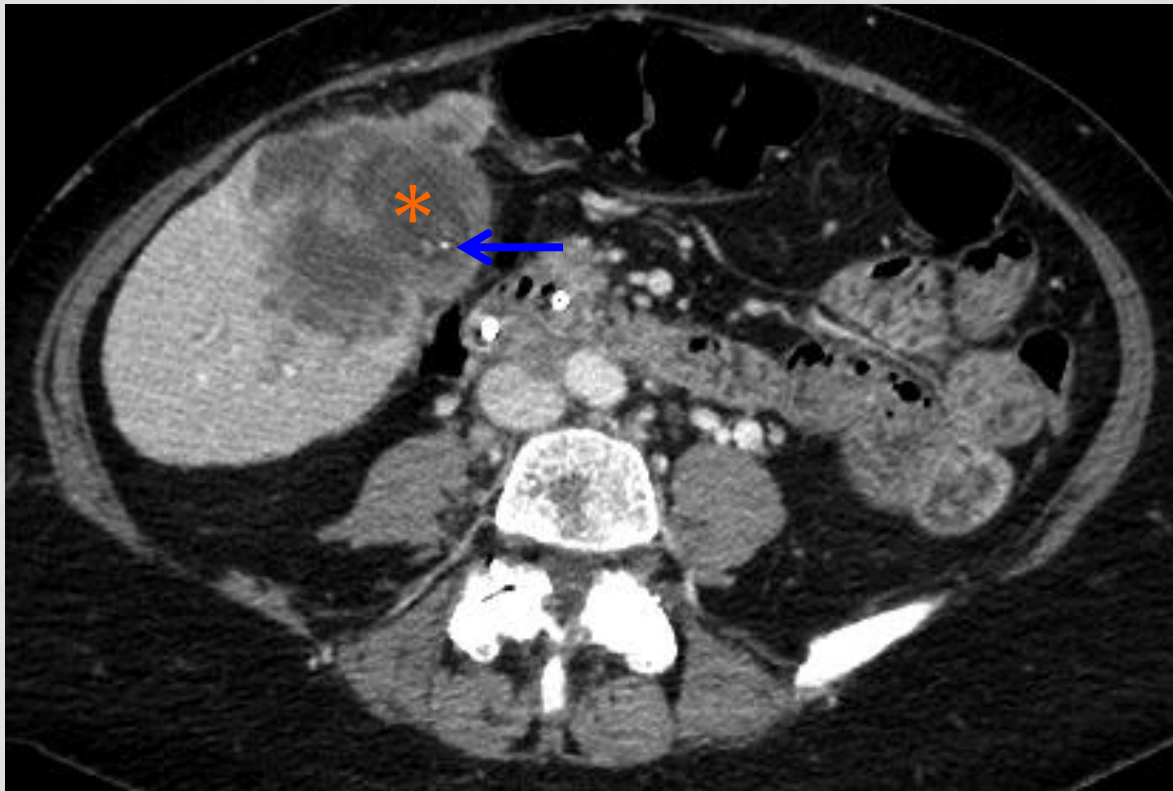
Gallbladder carcinoma

Central liver malignancies invading gallbladder (HCC, cholangio, mets)

Axial view, C+ CT abdomen, portal venous phase

PACS, BIDMC

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Axial view, C+ CT abdomen, portal venous phase

PACS, BIDMC

- Our patient's CT is most consistent with **gallbladder adenocarcinoma** invading into the surrounding liver parenchyma. Let's learn a little bit more about gallbladder carcinoma and its **three major radiologic presentations**.



GALLBLADDER CARCINOMA: BACKGROUND

- Most common biliary tract malignancy
- Most are adenocarcinoma (rarely, squamous cell)
- Variety of clinical presentations:
 - Symptomatic at late stages (abdominal pain, weight loss, fever, jaundice)
 - Malignancy found incidentally on imaging
 - Malignancy found intraoperatively at cholecystectomy
 - Malignancy diagnosed incidentally by histopathology after cholecystectomy

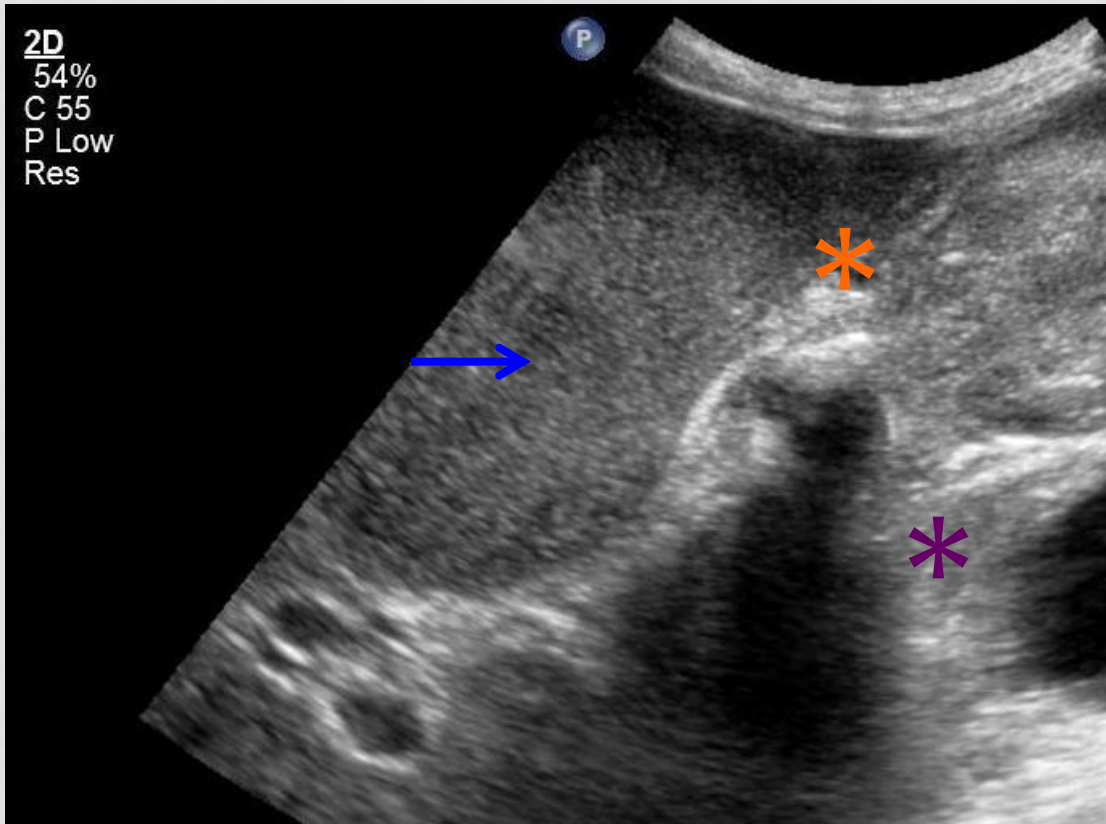


GALLBLADDER CARCINOMA: 3 MAJOR RADIOLOGIC PRESENTATIONS

- 1) Mass occupying or replacing lumen (40-60%)
- 2) Focal or diffuse gallbladder wall thickening (20%–30%)
- 3) Intraluminal polypoid mass (15%–25%)

- We've already seen the most common radiologic presentation of gallbladder carcinoma, a mass replacing the gallbladder lumen, on contrast-enhanced CT. Let's see how these masses present on ultrasound.

COMPANION PATIENT 1: GALLBLADDER MASS ON ULTRASOUND



Gallbladder ultrasound, axial view

- Heterogeneous, predominantly **hypoechoic mass with echogenic foci** representing stones or tumor calcifications.
- **Gallstone in region of porta hepatis** with associated acoustic shadowing.
- **Renal cyst.**
- Pathology confirmed adenocarcinoma

- Next, let's take a closer look at gallbladder carcinoma presenting as gallbladder wall thickening.



GALLBLADDER CARCINOMA PRESENTING AS WALL THICKENING

- Focal or diffuse, asymmetric
- Characteristics that suggest malignancy on CT
 - Irregular or focal wall thickening
 - Two-layer pattern: hyper-enhancing thick inner layer with thin non-enhancing outer layer
 - One-layer pattern: heterogeneously enhancing thick layer

Differential diagnosis: gallbladder wall thickening

Acute and chronic
cholecystitis

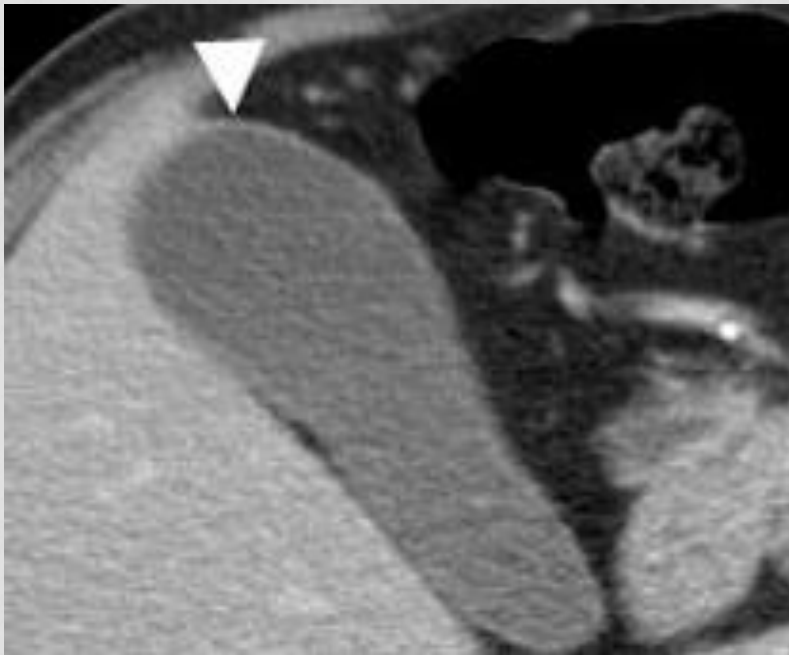
Adenomyomatosis

Xanthogranulomatous
cholecystitis

Diffuse hepatic or systemic
diseases

COMPANION PATIENT 2: GALLBLADDER WALL THICKENING ON CT

Normal, thin gallbladder wall



Axial view, C+ CT abdomen

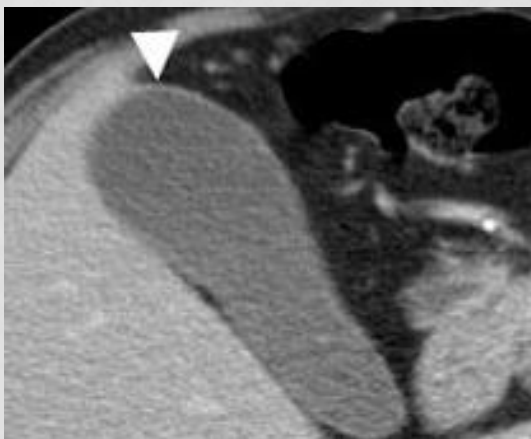
Acute cholecystitis with thick mucosal wall and hypodense subserosal edema



Axial view, C+ CT
abdomen

OUR PATIENT: GALLBLADDER WALL THICKENING ON CT

Normal, thin
gallbladder wall

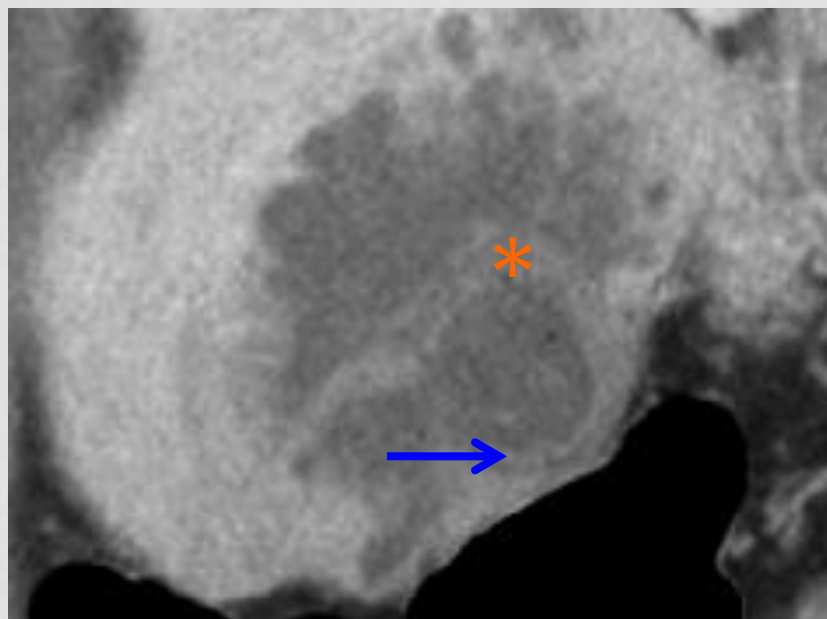


Axial view, C+ CT
abdomen

van Brieda Vriesman AC et al.
<http://rad.desk.nl/en/43a0746a-ccc5d>

Patterns of malignant wall thickening on CT:

- Irregular or focal wall thickening.
- **2 layer pattern:** hyper-enhancing thick inner layer with thin non-enhancing outer layer. **One-layer pattern:** heterogeneously enhancing thick layer.



PACS, BIDMC

Coronal view, C+ CT abdomen

- Finally, let's learn more about the third major presentation of gallbladder carcinoma: polypoid lesions of the gallbladder.



GALLBLADDER CARCINOMA PRESENTING AS POLYPOID LESION

- Polypoid lesion = any elevated lesion of the mucosal surface of the gallbladder
 - Found in up to 7% of healthy subjects and 2-12% of cholecystectomy specimens
- Markers of malignant polyps:
 - Single lesion
 - Sessile polyps
 - Size over 1 cm
 - Patient age over 60
 - Greater enhancement than normal gallbladder wall
- However, polyps are almost always benign: in a recent BIDMC study, 0/346 polyps were found to be malignant.

Differential diagnosis: Gallbladder Polyps

Benign tumors:

adenoma,
hemangioma, lipoma,
leiomyoma

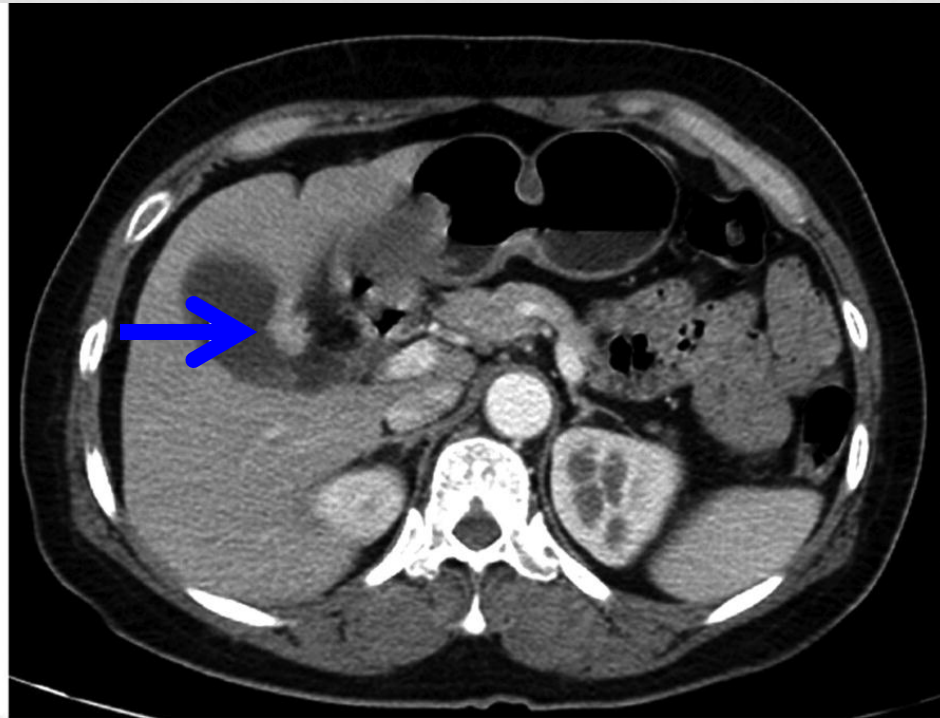
Benign pseudotumors:

cholesterol polyp (>50%), adenomatous hyperplasia, adenomyomatosis, inflammatory polyp, pseudotumorous sludge

Malignant:

adenocarcinoma

COMPANION PATIENT 3: POLYPOID LESION ON CT



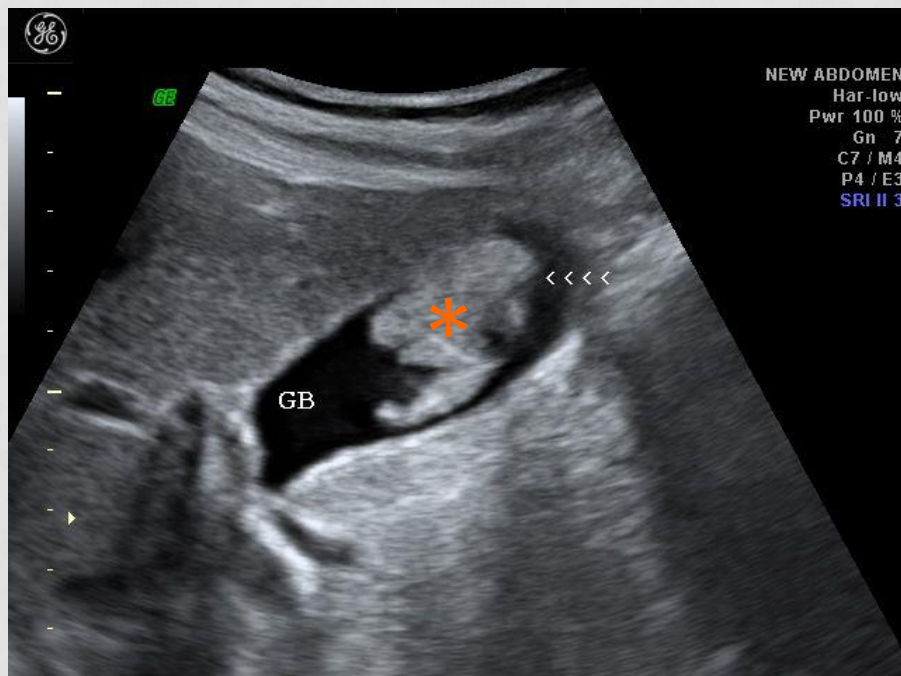
Axial view, C+ CT abdomen

There is a 1.6 cm single **pedunculated heterogeneously enhancing polypoid gallbladder mass.**

Pathology confirmed adenocarcinoma.



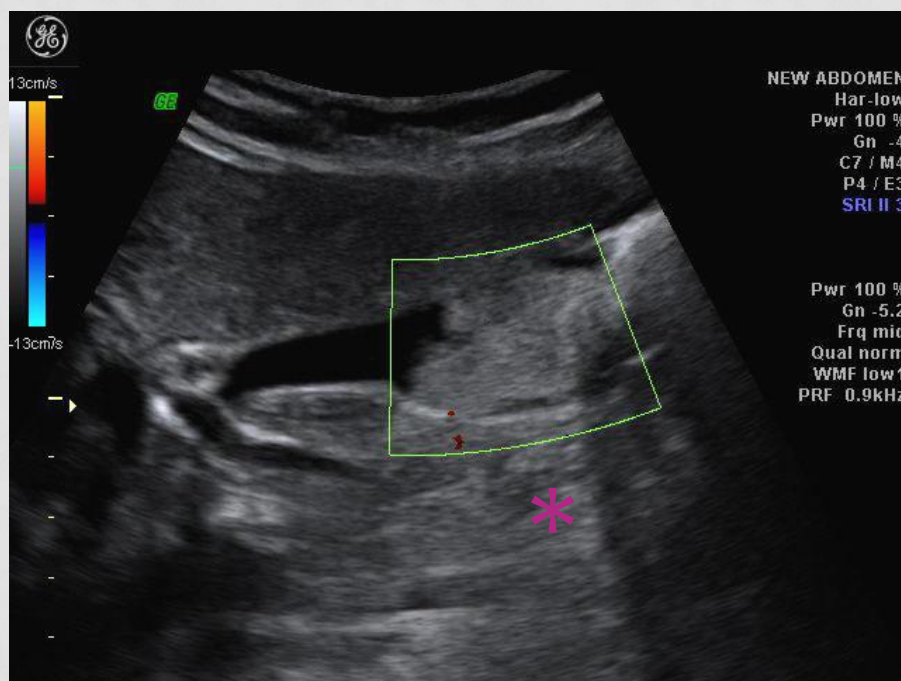
COMPANION PATENT 4: POLYPOID-APPEARING LESION ON ULTRASOUND



Gallbladder ultrasound, axial view

Irregular, heterogeneous, predominantly hyperechoic mass in the gallbladder lumen. This mass appears worrisome for gallbladder carcinoma...

COMPANION PATENT 4: PSEUDOTUMOROUS SLUDGE MASQUERADING AS POLYPOID LESION ON ULTRASOUND



...After rolling the patient, the apparent **mass collected in the dependent region of the lumen**, suggesting semi-solid biliary sludge rather than a solid mass. Note the **absence of acoustic shadow** as well as absence of flow on color doppler.

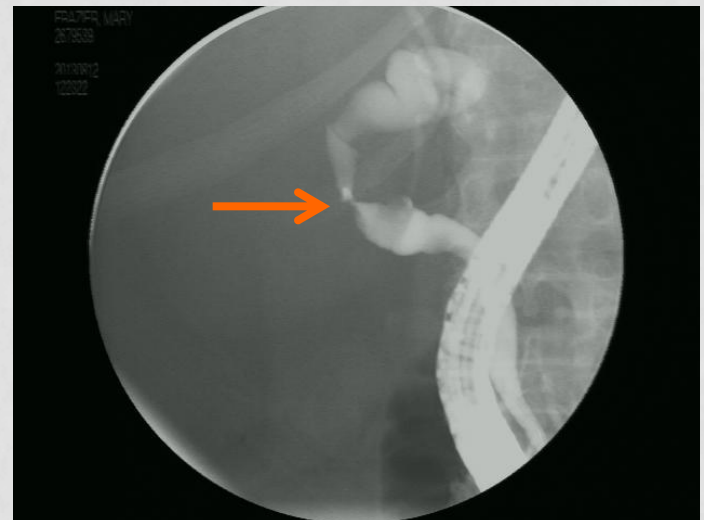
Gallbladder ultrasound with color doppler, axial view

- Back to our patient...

OUR PATIENT: ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP)

- ERCP
 - Useful for assessing involvement of bile ducts, obtaining cells for cytology, planning surgical procedures, and relieving obstruction.
- Findings in our patient:
 - 10 mm **malignant-appearing structure** in the common bile duct in the region of the hilum.
 - Sphincterotomy was performed, and stent was placed across stricture.
 - Cytology samples were obtained from the region of the stricture.

PACS, BIDMC



ERCP, common bile duct

- Cells obtained from the region of the patient's stricture returned **positive for adenocarcinoma**. Next steps include staging, for which the TNM system is used.

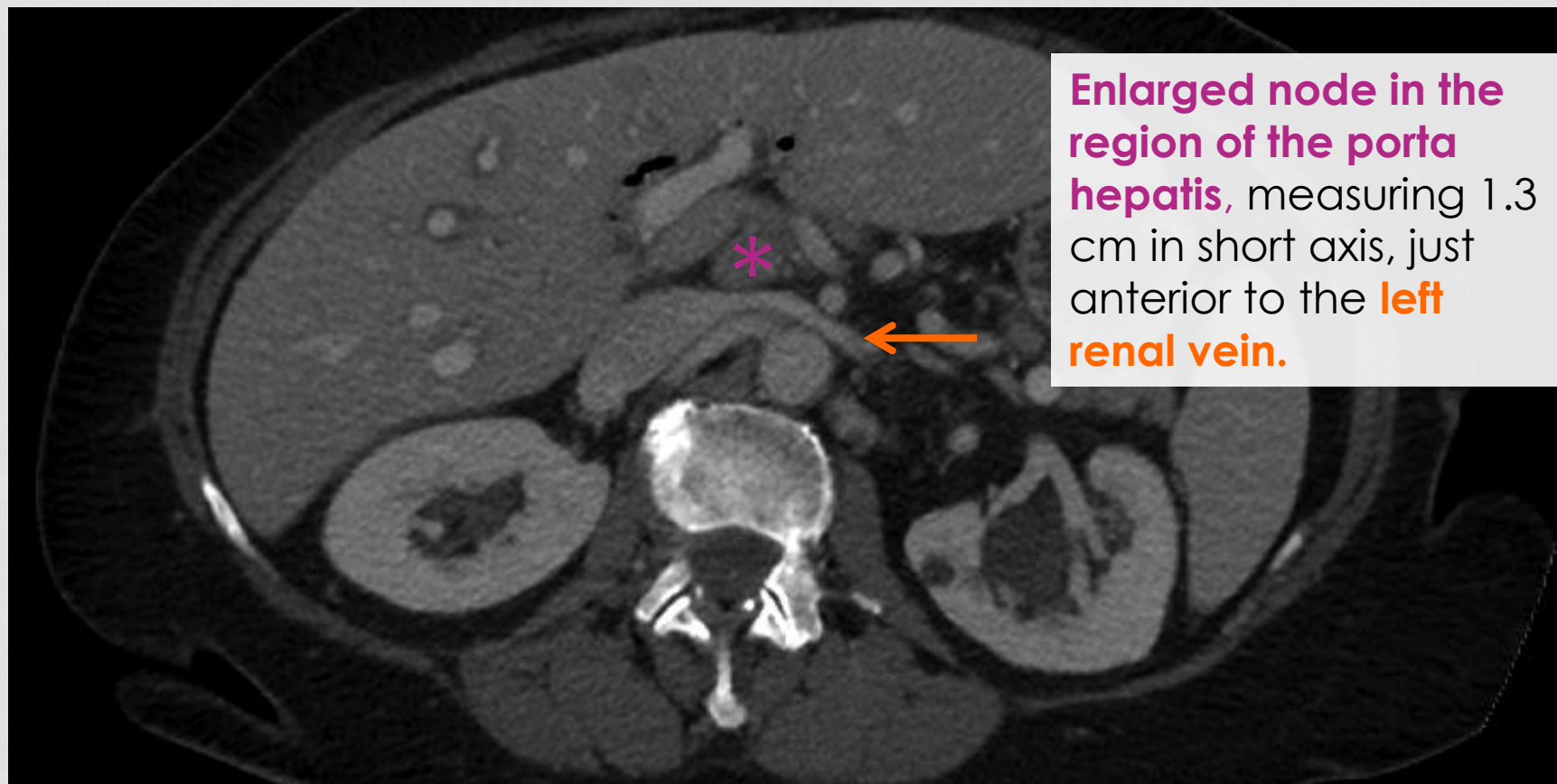


STAGING OF GALLBLADDER CANCER: IMAGING MODALITIES

- Radiographic tools for staging
- Primary imaging modalities: CT and MRI (with MRCP)
- Endoscopic ultrasound:
 - Better than transabdominal ultrasound in predicting histologic diagnosis
 - Useful for assessing depth of tumor invasion into the wall
 - Can obtain bile for cytologic analysis (sensitivity 73%) or perform EUS-guided FNA
- PET/CT:
 - 86% of gallbladder cancers are FDG-avid, but many inflammatory conditions that present with wall thickening or polypoid changes will also take up FDG.
 - Utility in detecting occult metastases → may prevent futile resection.



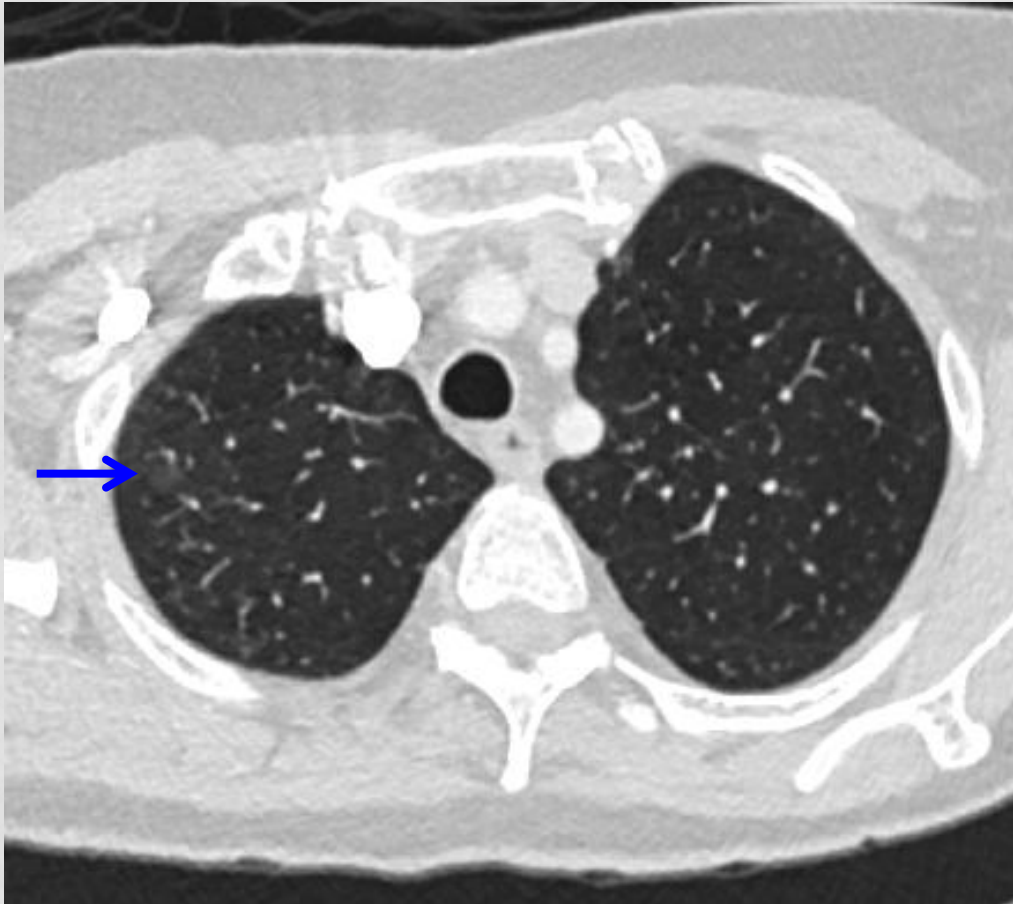
OUR PATIENT: PORTAL LYMPH NODE ENLARGEMENT ON CT



Enlarged node in the
region of the porta
hepatis, measuring 1.3
cm in short axis, just
anterior to the **left
renal vein.**

Axial view, C- CT abdomen

OUR PATIENT: LUNG METASTASES ON CT



Axial view, C+ CT chest

PACS, BIDMC

A 7 mm ground-glass opacity was noted in the right upper lobe.

On other slices, multiple smaller pulmonary nodules were noted bilaterally, ranging from 2 mm to 4 mm in size.

These were thought to likely represent lung metastases.



CONCLUSIONS

- Unfortunately, our patient's disease involved 3 lobes of the liver with likely mets to the lung, so she is not a surgical candidate. She is currently considering chemotherapeutic and palliative options.
- As this case illustrates, gallbladder cancer has a poor prognosis largely because it is often discovered late, at an unresectable stage.
- Gallbladder carcinoma requires a high level of suspicion for early diagnosis, as its 3 major radiologic presentations (mass invading the lumen, wall thickening, polypoid lesion), resemble common presentations of benign conditions.



ACKNOWLEDGEMENTS

- Thank you to my “big sib” Kate Troy for her help with this presentation and throughout the rotation.
- Thank you to Dr. Kristopher Daley and Dr. Robert Sheiman for suggesting this case.



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