RADIOGRAPHIC APPEARANCES OF GALLBLADDER CARCINOMA

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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

- **High likelihood benign biliary obstruction (painful jaundice):** Ultrasound
- **High likelihood malignant biliary obstruction (painless jaundice):** Ultrasound + Multidetector CT
- **Low likelihood of mechanical obstruction:** Ultrasound to rule out obstruction + MRI liver
INITIAL ASSESSMENT OF JAUNDICE: ACR APPROPRIATENESS CRITERIA

High likelihood benign biliary obstruction (painful jaundice)
- Ultrasound

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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

Axial view, C+ CT abdomen, portal venous phase

Gallstone in gallbladder fossa.

Hypodense mass filling gallbladder lumen and invading surrounding liver.
DIFFERENTIAL DIAGNOSIS:
MASS REPLACING GALLBLADDER LUMEN

- 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
## Differential Diagnosis:

**Mass Replacing Gallbladder Lumen**

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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

- 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

Gallbladder ultrasound, axial view
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:
- 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

Both images from: van Brieda Vriesman AC et al. http://rad.desk.nl/en/43a0746accc5d
OUR PATIENT:
GALLBLADDER WALL THICKENING ON CT

Normal, thin gallbladder wall

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.

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

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

Pathology confirmed adenocarcinoma.

Axial view, C+ CT abdomen

COMPANION PATENT 4: POLYPOID-APPEARING LESION ON ULTRASOUND

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

Gallbladder ultrasound, axial view

http://www.ultrasound-images.com/gall-bladder.htm#
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

http://www.ultrasound-images.com/gall-bladder.htm#
• 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.
• 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.
OUR PATIENT: LUNG METASTASES ON CT

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.
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