Mimics of Malignancy in Abdominal Imaging

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Is it Cancer?

- There are common and uncommon conditions which can be confused for cancer in abdominal imaging:
  - Fibrosing disease
  - Inflammatory/deposition disease
  - Infection
  - Benign tumors or mass lesions

- There are patterns of imaging, clinical clues, and categories of disease that can help the radiologist suggest a non-malignant diagnosis, avoiding unnecessary anxiety and procedures.
Learning objectives

• Recognize the categories of non-malignant disease which can mimic cancer
• Identify the clinical situations which suggest a non-malignant diagnosis
• Construct a complete differential diagnosis suggesting appropriate malignant and non-malignant diagnoses
Case #1: 50 year-old male with abdominal pain...

Key findings:
- Hazy mass at the root of the mesentery
- Pseudocapsule (upper arrows)
- Fat-ring sign (lower arrow)
3 years later...

Key Findings:
- Progressive fibrosis
- Calcifications
- SMV occlusion
- Varices
Sclerosing mesenteritis

- Idiopathic, chronic inflammation of the mesentery
- Can be IgG4-related
- Subtypes based on predominant histopathology
  - Mesenteritic panniculitis (inflammation)
  - Retractile mesenteritis (fibrosis)
- DDX: Lymphoma, pseudotumor, carcinoid, desmoid, GIST

Calcifications – coarse/punctate

Mesenteric panniculitis

Fibrosis, tethering of small bowel
Case #2: 40 year old with history of familial polyposis and colectomy...

Key findings:
- Large round heterogeneous abdominal mass
  - Renal obstruction
  - Left lower quadrant ileostomy
Abdominal fibromatosis (desmoid)

- Histologically benign, but locally aggressive
- Sporadic or associated with familial polyposis
- Intraabdominal
  - Most are sporadic and singular
  - 9-18% association with familial polyposis (Gardner syndrome)
- Abdominal wall
  - During pregnancy or within 1 year of childbirth
  - Association with OCPs
Case #3: Abdominal pain and mild hydronephrosis...

Key findings:
- Enhancing soft tissue encasing but not displacing aorta
- Medial displacement of ureters
Retroperitoneal fibrosis

- Proliferation of fibroinflammatory tissue around the aorta
- **Idiopathic**
  - Immune-mediated response from atheromatous plaques
  - IgG4
- **Secondary**
  - Drugs (ergot derivatives), infection, or malignancy
- Usually begins at L4/L5 and ascends
- Ureteral entrapment and obstruction
- DDX: Lymphoma (frequently “lifts” the aorta)

Contrast MRI with perirenal soft tissue

Perisplenic and perihepatic involvement

Left renal obstruction

Aortic and colonic involvement
Case #4: 50 year old male with renal obstruction...

- Soft tissue infiltration and encasement of the kidneys
- Medullary sclerotic lesions
- Soft tissue infiltration of the right ventricle and AV groove
Erdheim-Chester disease

- Non-Langerhans’ histiocytosis
- 40-70 years-old
- Bone pain most common presentation
- Abnormal proinflammatory cytokine response resulting in systemic proliferation and infiltration of histiocytes, involving any organ system
- Diagnosis made on the basis of imaging features and the presence of foamy histiocytes (CD68+ and CD1a-)

- Ureteral soft tissue thickening and renal obstruction
- Adrenal infiltration
- “Hairy kidney”
- “Coated aorta”
Case #5: 46 year-old male with multiple abdominal findings...

Key Findings:
- Bilateral renal masses
- Geographic liver lesions
- Multifocal biliary strictures
IgG4-sclerosing disease

- Multi-organ infiltration of IgG4 + plasma/T-cells
- Numerous manifestations: autoimmune pancreatitis, retroperitoneal fibrosis, inflammatory pseudotumor, primary sclerosing cholangitis, sclerosing mesenteritis, and others
- Excellent response to steroids
Case #6: 60 year old male with multiple myeloma...

Key Findings:
- Omental thickening
- Peritoneal, renal and hepatic calcifications
- Renal enlargement and hydrenephrosis
Amyloidosis

- Extracellular deposition of protein/protein derivatives
- Tumor-like infiltration of any organ, resulting in organ dysfunction
- GI tract (dysmotility), heart (restrictive cardiomyopathy), airway, lungs, GU, MSK, vascular
- Primary – multiple myeloma
- Secondary – chronic inflammation

Hepatomegaly and splenic infiltration

Renal and perirenal

Mesenteric infiltration

Mesenteric thickening and calcification
Case #7: Two patients with suspicious masses...
Inflammatory pseudotumor

- Polymorphous inflammatory cell infiltrate, with single or multiple masses
- Cannot distinguish from malignancy
- Usually needs multiple biopsies to reach a diagnosis
- NSAIDS and steroids may help
- Sarcomatoid transformation can occur

Central obstructing biliary mass simulating a Klatskin tumor

Large mid abdominal mass with gross pathology
CASE #8: History of mediastinal adenopathy and interstitial lung disease (different patients)...

Liver/spleen enlargement and infiltration

Testicular sarcoidosis

Abdominal sarcoidosis

- Extrapulmonary involvement in up to 30%, which can mimic infection or neoplasm
- Hepatosplenomegaly, low-attenuation nodules
- Peritoneum, lymph nodes can also be affected
- DDX: Lymphoma, granulomatous infection, metastases
CASE #9: 35 year old with abdominal mass...

Castleman disease

- Non-neoplastic, non-clonal lymph node hyperplasia
- Idiopathic or associated with HIV, lymphoma, POEMS and others
- Avidly-enhancing adenopathy
- 90% Hyaline vascular
  - Younger patients, unicentric, asymptomatic, benign course
- 10% Plasma cell
  - Older patients, more often multicentric, worse prognosis
- HHV-8-associated
  - Immunosuppressed patients, very aggressive, poor survival
**BONUS ROUND: What is that “stuff” around the kidneys?**

- **Perirenal lymphoma**: lymphocytes
- **Amyloid**: protein
- **RPF**: fibroinflammatory tissue
- **Erdheim-Chester disease**: histiocytes
- **EMH**: hematopoietic cells
- **IgG4**: plasma and T-cells
Case #10: 46 year-old female with 6 month history of abdominal cramping....

Key Findings:
• IUD
• Complex, enhancing abdominal and pelvic fluid collections
Actinomycosis

- Chronic granulomatous infection by *Actinomyces israelii*, a normal colonizer of the female genital tract
- IUD causes mucosal microtrauma and organism gains access to female genital tract
- Often presents after several months of symptoms
  - Leukocytosis, elevated CRP
- Appearance can be infiltrative in addition to solid, complex, and cystic masses
- Shares imaging features with ovarian cancer -> IUD and inflammation are clues to infectious etiology
- Treated with drainage + long term penicillin
- DDX: Cystic ovarian neoplasm
Case #11: Abdominal pain and fever...

Key Findings:
- Thick-walled gallbladder
- Infiltration into liver
- Surrounding inflammation
Xanthogranulomatous inflammation

- Chronic destructive granulomatous process due to incomplete immune response to a subacute bacterial infection
- F>M, diabetes in 10% of patients
- **Pyelonephritis**
  - Recurrent bacterial infection
  - Renal parenchyma replaced by lipid-laden macrophages
  - Associated with staghorn calculus
- **Cholecystitis**
  - Chronic granulomatous inflammation
  - Associated with gallbladder carcinoma

Circumferential, enhancing gallbladder wall thickening
Case #12: Two patients with pelvic and RUQ pain...

Fitz-Hugh-Curtis syndrome
- Salpingitis due to chlamydia or gonorrhea
- Right upper quadrant peritonitis
- Adnexal fullness + clinical exam
- Gallbladder wall thickening, peritonitis, transient hepatic perfusion abnormalities
Case #13: Several immunocompromised patients with fever...

Disseminated fungal Infection

- Immunocompromised, pregnant, elderly, infants
- Usually self-limited following inhalation, rarely progresses to systemic infection
- Various manifestations: Hepatomegaly, splenomegaly, focal lesions, adenopathy, peritoneal, genital tract, skin, skeletal

Coccidiomycosis

Adenopathy

Splenic blastomycosis

Liver infiltration

Liver lesions

Different patients with histoplasmosis
Case #14: 40 year-old female with pelvic pain and infertility...

Key Findings:
- Complex, fibrotic pelvic mass
- Invasion of vaginal fornix, torus uterinus, rectovaginal septum and inferior rectum
Endometriosis

- Endometrial tissue outside the uterus
- Ovary, pelvic ligaments, rectosigmoid colon, bladder, cul-de-sac, surgical scar
- Superficial/non-invasive
- Ovarian endometrioma
  - Most common
- Deep/infiltrating
  - > 5mm subperitoneal invasion
  - Pain, dysmenorrhea, dyspareunia, infertility
- DDX: Pelvic mass, bladder cancer, colon cancer, desmoid, carcinoid, GIST

Deep pelvic endometriosis invading vagina, bladder, and rectum
Case #15: 22 year old male with testicular masses...

**Adrenal rests descended with the testes during embryogenesis**

- Primarily seen in setting of congenital adrenal hyperplasia
- 21-hydroxylase deficiency -> low glucocorticoid/mineralcorticoid levels -> excess ACTH -> adrenal hyperplasia

**Testicular adrenal rest tumor (TART)**

- Adrenal rests descended with the testes during embryogenesis
- Primarily seen in setting of congenital adrenal hyperplasia
- 21-hydroxylase deficiency -> low glucocorticoid/mineralcorticoid levels -> excess ACTH -> adrenal hyperplasia
Splenosis
• Heterotopic autotransplantation following splenectomy or trauma
• Mimic of pancreatic neoplasm
• Tc-99m heat damaged RBCs or MRI with ferumoxytol to confirm

Case #16: Multiple patients with abdominal masses...

Rounded, homogeneous enhancing abdominal and pelvic masses

Tc-99m sulfur colloid
Case #17: Myeloproliferative disorder with concern of peritoneal carcinomatosis...

**Extramedullary hematopoiesis**
- Hematopoietic cells outside of bone marrow
- Occurs in hemoglobinopathies, myeloproliferative, bone marrow disorders
- Liver, spleen, kidneys, posterior mediastinum, peritoneum
- How did it get there?
  - Subpopulations of cells likely retain pluripotent potential

**Images:**
- Pre splenectomy
- Post splenectomy
- Splenomegaly
- Mesenteric and bowel wall thickening
- Different patients
- Carcinomatosis mimic
- Abdominal mass
Case #18: Multiple patients with abdominal mass...

Fat necrosis/omentoal infarct

- Associated with obesity, strenuous activity, congestive heart failure, and surgery/trauma
- More common in right abdomen – appendicitis mimic clinically
- Conservative management
Summary

**Fibrosing**
- Sclerosing mesenteritis
- Abdominal fibromatosis (desmoid)
- Retroperitoneal fibrosis

**Inflammatory/deposition**
- Erdheim-Chester disease
- IgG4-sclerosing disease
- Inflammatory pseudotumor
- Sarcoidosis
- Castleman disease
- Amyloidosis

**Infectious**
- Actinomycosis
- Fitz-Hugh-Curtis
- Disseminated fungal
- Xanthogranulomatous

**Benign tumors or mass lesions**
- Testicular adrenal rest tumor
- Splenosis
- Endometriosis
- Extramedullary hematopoiesis
- Fat necrosis/omental infarct
Suggested readings


