Avoiding Abdominal Apocalypse

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Objectives
1. Describe key elements of history and physical exam that can reveal a diagnosis, or, when omitted, result in diagnostic failure.
2. Describe limits of laboratory and imaging tests for dangerous abdominal conditions.
3. Discuss the role of CT contrast agents for some pathological processes.
4. Describe the importance of therapeutic interventions for time-sensitive abdominal processes.

Do (and document) a good H&P.

- Imaging doesn’t replace due diligence.
Do (and document) a good H&P.

- 17 year old male, no PMH
- RLQ pain x 24h
- denies fevers, chills, vomiting, or diarrhea
- + anorexia and nausea which he attributes to 10/10 pain
- Normal vitals
- RLQ tender, + guarding
- WBC 7.6k
- 82.5% neutrophils
- UA neg

Case 1

Workup

CT is performed with oral and IV contrast

Radiologist:
“Study unremarkable. Please note that the appendix was not definitively identified. This study does not exclude the possibility of early appendicitis.”

What do these have in common?
Both are artful hedges

Does a normal CT that does not visualize the appendix rule out appendicitis?
Study | Population | Rate of appendicitis
---|---|---
606 consecutive adults | 2% rate of appendicitis when appendix not seen and no secondary signs of appendicitis (one female patient with paucity of RLQ fat).
400 consecutive patients, 20% with appendicitis | 2%
1139 children | In kids, negative predictive value 98.7% for nonvisualized appendix, 100% partially visualized, 99.6% fully visualized -- not statistically different.

**Case 1**

Patient discharged, instructed to follow-up if pain does not improve.

1 hour later presents to a second ED...

The patient states "I want my follow-up now."

Discharged.

**Case 1**

24 hours later, presents again to 2nd ED.

More history: sexually active, no condoms. Denies dysuria or discharge.

GU exam: right testicular tenderness
**Case 1**

**Outcome**

Testicular ultrasound performed

OR: orchiectomy

Original CT, on review...

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**Form a differential diagnosis.**

- Share it with your radiologist and other consultants.
- See case 1.

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**A little experiment**

- On the next slide, find the pulmonary nodules.
- Ready?
Radiologists are human

83% of radiologists missed the gorilla, despite looking directly at it

(For sick patients) treat first, ask (diagnostic) questions later.

• "The patient died, but the imaging was diagnostic."
A 75 year old trauma patient, traveling in a car struck by a train.
CT: pulmonary contusions, a peri-aurtic hematoma, free fluid around the liver, and pelvic superior rami fractures.
Three hours after CT, the patient suffered a PEA arrest – having received virtually no resuscitation.

Hunt for time-sensitive and dangerous diagnoses early.

- Avoid delay tactics such as oral contrast, non-essential x-rays, and imaging for less critical diagnoses.

Make stuff happen. Fast.

- If searching for catastrophe, assume you will find it. Don’t wait for it to find you.
Make stuff happen. Fast.

• 35 y/o male, no PMH/PSH
• abdominal pain x 24h
• BP 119/77
• HR 93
• RR 20
• T 35.6°C
• oxygen saturation 99%
  RA
• left flank, RUQ tenderness

(Normal imaging doesn’t mean normal patient.)

• Workup initiated from triage
• WBC 25k
• bicarb 13
• anion gap 20
• glucose 250s
• AST 47 (upper limit 41)
• EKG NSR, normal
• Noncontrast CT from triage: normal

• What disease processes can occur with a normal noncontrast CT?
• (What is your differential diagnosis?)

Make stuff happen. Fast.

• RUQ US performed next, normal.

• Lactate high, acidotic. Now suspect...

• CT with IV and oral contrast performed... 12 hours after ED arrival
SMA thrombosis

- 96% sensitive
- 94% specific
- IV contrast only


Make stuff happen. Fast.

- Laparotomy performed 19 hours after ED arrival
- Near complete infarction small bowel
- Patient TPN dependent due to extensive bowel resection

Take-home points

Consider mesenteric ischemia

Do not rely on x-ray to exclude this (or other important) diagnoses

When ischemia is truly suspected, avoid any diagnostic delay — NO ORAL CONTRAST FOR CT

Involve a surgeon early

Guidelines call for surgery – catheter-based procedures are little studied and can result in catastrophic delay
Consider diseases outside of the abdomen.

• See case 1.
• And this case....

Consider diseases outside of the abdomen.

• 42yo female
• 3 days of left flank pain
• “Worse in waves”
• “Sharp, radiating, constant”
• Worse with movement
• Improved with sitting crouched on bed
• No chest pain
• No dyspnea

Consider diseases outside of the abdomen.

• PMH:
  • 1. Fibroid tumors of the uterus.
  • 2. Vertigo.
  • 3. Eczema.
  • 4. Asthma.
  • 5. Seasonal allergies.
  • 6. Recent CT suggestive of lung cancer with metastases
The case of the colicky cancer

• VITALS:
  • 172/73
  • 100
  • 19
  • 36.1 (97.0)
  • SaO2 96% on RA

• Resident Note:
  • “DIFFERENTIAL Dx: metastatic lung CA, pyelonephritis, nephrolithiasis baseline labs, non-contrast CT, analgesia”

CT report

Impression:

New heterogeneous opacities in the left lower lung, which may be due to infection, aspiration, or spread of malignancy.
ED course

ED Resident Note:
- "prelim CT: Dystrophic fibroids obscuring L ureter, L lung base with consolidation and ground glass opacity, no obvious stones"
- "CXR to eval lung findings"

"Impression:
1. Right perihilar smoothly marginated mass, concerning for malignancy.
2. Bilateral heterogeneous opacities, left much greater than right. While this may represent atelectasis given the ipsilateral volume loss, an underlying infection or edema is also possible."

Case of the colicky cancer patient

- Noncontrast CT demonstrates left pulmonary parenchymal opacity
- CXR then performed, shows "infiltrate"
- Patient placed in observation unit on antibiotics, pneumonia protocol

Case of the colicky cancer patient

- Next morning, patient hypoxic and tachycardic
- CT chest performed, shows massive PE
- US shows large DVTs
- Within 2 months, patient is dead
Normal imaging doesn’t mean normal patient.

• Ask “what are the blind spots?”
• What else could cause signs and symptoms?
• Include the original diagnosis on that list (consider false negatives).

Normal imaging doesn’t mean normal patient.

• 30 year old female with severe and sudden right lower abdominal pain, HCG negative
• Suspect...

Ultrasound showed normal arterial and venous flow in the right ovary
• In ED, patient vomits and has severe recurrent pain.
• Repeat ultrasound showed only dampened venous flow.
• In OR, ovary twisted 4 complete turns on its vascular pedicle.
• Arterial or venous flow may be present in a torsed ovary
• Dane: blood flow was present in 6 of 21 cases (28%)
• Shadinger: reviewed 39 cases of pathologically proven ovarian torsion
  • 13 (33%) had venous flow
  • 21 (54%) had arterial flow
• Pena: normal Doppler findings in 6 of 10 patients with proven ovarian torsion
  • delays in diagnosis when flow was present, likely reflecting undue confidence by physicians in use of ultrasound to rule out ovarian torsion

Beware of zebras.
• One person’s case report is another’s M&M.
• More likely an uncommon presentation of a common disease than a common presentation of a rare disease.

Free fluid
Markedly thickened and enhancing small bowel

Beware of zebras
• Paraplegic patient, sudden acute abdominal pain after fall from wheelchair while intoxicated
• Radiologist: “possible ACE-inhibitor induced bowel angioedema”
• Surgery signs off
Free fluid

Markedly thickened and enhancing small bowel

- Medicine consulted
- Patient more tachycardic
- Lactate rises
- Acute abdomen on exam
- Surgery to OR
- Bladder rupture → peritonitis → abdominal compartment syndrome

Put images in context.

- To borrow a phrase from another specialty, "correlate clinically."
- See earlier cases
Put images in context.

- 69 year old female with pancreatic cancer presenting with abdominal pain and vomiting
- BP 80/40
- HR 133
- T 38.7°C
- Exam:
  - confused
  - diffusely tender abdomen
  - mild jaundice

What is your differential diagnosis? How would you assess for the disease(s) in question?

CT performed.

Radiologist reports:

“Dilated intrahepatic biliary ducts seen”

- CT with oral and IV contrast was performed
- What finding is present? Is contrast needed?
ED Chart:

Dilated intrahepatic biliary ducts suggest distal ductal obstruction, a risk factor for ascending cholangitis.

Patient needs a procedure to alleviate obstruction – eg percutaneous biliary drain, biliary stenting via an interventional radiological procedure, or ERC/Percutaneous drain… in addition to antibiotics and resuscitation for sepsis.

Cholangiogram performed

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**Take-home points**

- Biliary ductal dilatation suggests biliary obstruction.
- In presence of biliary ductal obstruction, ascending cholangitis may develop.
- Charcot’s triad includes fever, jaundice, abdominal pain.
- Reynold's pentad adds hypotension and altered mental status.
- Escherichia coli is the most common organism, but other GNR and anaerobes may occur.
- Deadliest infection with a mortality approaching 100% historically but only 5-10% with appropriate treatment including biliary decompression.

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**Look at images yourself as soon as available. Look beyond the obvious.**

- Sometimes incidental findings distract from more important abnormalities.
Check Occam’s Razor at the Door.
We play by Hickam’s Dictum

Of course, occasionally X marks the spot
Summary

- Do and document a good H+P
- Form a differential diagnosis, and share it
- Don’t let diagnostic tests delay treatment
- Hunt early for time-sensitive, dangerous diagnoses
- Make stuff happen, fast

- Normal imaging doesn’t mean a normal patient
- Consider diseases outside the abdomen
- Beware of zebras
- Put images in context
- Look at images yourself