Abdominal Vascular Emergencies: Pearls and Pitfalls

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Clinical Case: “Peter”

- 66 yo M hx of previous kidney stones and known AAA (measured at 5.4 cm by US one month ago)
- Today developed very severe pain in R flank, no abd pain, sudden onset; does feel like previous renal stone
- Background of vague back pain for 2-3 weeks

Clinical Case: “Peter”

- Patient concerned about radiation risks
- Urine dipstick: large blood
- Creatinine (baseline): 2.3

His previous CT Angio
Abdominal Vascular Emergencies

Abdominal Aortic Aneurysm (AAA)
Aortic Dissection (AD)
Acute Mesenteric Ischemia (AMI)

Goals & Objectives

**Pearls and Pitfalls related to:**

- History & Physical
- Serum Biomarkers
- Diagnostic Imaging

**Detection (When/How to Test)**

- ~60 yrs + Concerning hx Pulsatile mass
- Good Hx, “Weird” Exam Consider Ddimer, US
- Abdominal pain +elderly +embolic risk +/- lactate

**Diagnosis (Imaging)**

- CT angio OR US, CT(-) with clinical picture
- (1) CTA (2) TEE
- U/S: take a look...
- CTA

**Decision (ED Treatment & Consults)**

- Volume + (Vasc) Surg or Die
- Lower BP! A: Surgery B, complicated: (Vasc) Surgery B: Medicine
- Volume, abx, heparin gtt; IR + (Vasc) Surgery

History & Physical
History

- Sudden onset epigastric pain
- Flank pain or back pain
- Syncope

Physical Exam:
Abdominal Palpation

- Sensitivity: 76%
- PPV: 43%
- Positive Likelihood ratio: 15.6 [CI 8.6-15.6]

Take Home Point #1

*Abdominal vascular emergencies don’t always present within the abdomen.*

Considering AAA?

Look at the legs!
Pitfall:
You have to look!

Aortic Dissection History: Positive Likelihood Ratios

<table>
<thead>
<tr>
<th>Symptom/Finding</th>
<th>Increased Disease Probability</th>
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<tbody>
<tr>
<td>Tearing/Ripping Pain</td>
<td>10.8x (5.2-22.0)</td>
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<tr>
<td>Migrating Pain</td>
<td>7.6x (3.6-16.0)</td>
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<tr>
<td>Sudden Chest Pain</td>
<td>2.6x (2.0-3.5)</td>
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<tr>
<td>Focal Neuro Deficit</td>
<td>33.0x (2.0-549.0)</td>
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Quality of History Taking in Patients With Aortic Dissection*

Howard S. Roman, MD, FACC; Sorine Patel, MD; Steven Bortzak, MD; Carllano Fahey, MD, FACC; and Kenneth Better, MD

• Retrospective review of confirmed AD cases
• Only 42% had documentation of pain quality, radiation, & onset
  • If all 3 asked: dx made 91% of the time
  • If just one omitted: dx made 49% of the time

Weird Presentations

Case Report
Aortic Dissection and Thrombosis Diagnosed by Emergency Ultrasound in a Patient with Leg Pain and Paralysis
Malperfusion syndromes

- Stroke syndromes
- Myocardial Infarction
- Pericardial tamponade
- Paraplegia
- Renal failure
- Intestinal ischemia
- Acute Limb Ischemia

Take Home Point #1

Abdominal vascular emergencies don’t always present within the abdomen.

Chest, abdominal, or back pain + findings in unrelated or multiple organ systems = think aortic dissection

Serum Biomarkers

- 69 yo M with HTN, c/o sudden onset sharp chest pain radiating to the abdomen
- EKG: new anterior TWIs Trop 0.00
- EP considers dissection, but believes it is ACS hedges and orders a D-dimer while calling medicine admission.

Clinical Case: “Paul”
Biomarkers for AD

- Basis: observational data, cohort studies
- Potential “rule out” test?
- Prognostic value?

D-dimer for AD:

- 7 studies, 298 pts with AD, 436 without
- Multiple assays; D-dimer cut-off 500 ng/ml
- Sensitivity ~97%, Specificity 56%, LR (-) 0.06

Current Evidence

Biochemical Mechanism

- False negatives rates in dissection variants/patient subsets
- Time of rise, peak, clearance?
- Prospective studies in undifferentiated CP

What we need to know
• D-dimer >4000. Results as pt hits medicine floor (2.5 hr turnaround)
• Goes to CT:

Clinical Case 2: “Paul”

• Cardiothoracic Surgery consulted (7 hrs later)
• Survives surgery; discharged home; readmitted with complications & died one week later

Clinical Case 2: “Paul”

Take Home Point #2

Serum biomarkers can help you.
…they can also hurt you!

Lactate for Mesenteric Ischemia?

• Common practice: “rule out” mesenteric ischemia
• Basis: elective surgical pts, case series
Lactate for Mesenteric Ischemia?

**D-Lactate**
- Common practice: “rule out” mesenteric ischemia
- Basis: elective surgical pts, case series

**L-Lactate**

L-

LactateD-

- Produced by gut lumen bacteria
- More specific
- Elevation not early

**Biomarker Pitfalls:** Attribution Errors

- Amylase elevation (27%)
- LFT elevation (25%)
- Troponin (TnI) elevation (43%)

**Take Home Point #2**

Serum biomarkers *can* help you.

…they can also hurt you!
Diagnostic Imaging

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Definitive Diagnosis

CT angiogram is the test of choice for diagnosis of AAA, aortic dissection, and mesenteric ischemia.

Take Home Point #3

BUT we cannot, and should not, CT scan everybody.
## Radiation Risk is Real

<table>
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<tr>
<th>CT Head</th>
<th>Effective radiation dose (mSv)</th>
<th>CXR Equivalents</th>
<th>Number of scans needed to cause a cancer in a 60 yo M</th>
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<tr>
<td>CT Angiogram Dissection protocol</td>
<td>24</td>
<td>220</td>
<td>840</td>
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Smith-Bindman, et al, Arch Int Med 2009

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**Beyonce says:**

“If you like it than you should’ve put a ring on it.”

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**Brian-say:**

“If you don’t like it, than you should’ve put an ultrasound on it.”

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**Bedside Ultrasound**
R. mid-axillary lateral view increases aortic visualization by 28%

Abd Aortic US:
Don’t forget to look at the RUQ!

Ultrasound for AD
...worth a look?

The Diagnosis of Aortic Dissection by Emergency Medicine Ultrasound
John P. Fojtik, MD, Thomas G. Costantino, DO, and Anthony J. Dean, DO
Department of Emergency Medicine, Drexel University College of Medicine, Philadelphia, Pennsylvania.
Reprint Address: Thomas Costantino, DO, Department of Emergency Medicine, Temple University Hospital, 3400 N Broad St., Philadelphia, PA 19140.
Aortic US Windows

- Subxiphoid view
- Suprasternal view
- Intra abdominal aorta
- Longitudinal abd aorta
- R midaxillary view
- RUQ FAST

Suprasternal Aortic View

- Used to visualize aortic arch
- May show Type A dissection flap

Suprasternal Aortic View

- Normal

Suprasternal Aortic View

- Abnormal

Dissection Flap
Abdominal view

Aorta Longitudinal

Dissection Flap

Take Home Point #3

We cannot, and should not, CT scan everybody.

Consider alternative imaging strategies, especially ultrasound!

Clinical Case 3: “Mary”

- 76 yo F with hx of DM, afib, previous ischemic CVA, hx of right renal artery embolism, CKD (cre = 2.3)
- c/o diffuse pain
  She’s sweating, moaning
- Abd exam: “unimpressive tenderness”

Clinical Case 3: “Mary”

- WBC 14.8K
- Lactate 4.2
- Lipase 492
- INR 1.0
- Cre = 2.3
CT scans, IV contrast, and the beans

**Emerg Radiol 2010**
- In confirmed mesenteric ischemia cases:
  - 90% mortality if CT(-)
  - 42% mortality if CTA

**Eur J Vasc Endovasc Surg 2012**
- CTA ➔ Creatinine bumped, no HD nor mortality

**Take Home Point #3**

*We cannot, and should not, CT scan everybody.*

…but don’t be afraid to scan those who really need it!

**Clinical Case: “Peter”**

- Patient placed on monitors, 2 large bore IVs, labs including Type & Cross.
- Abdominal FAST US reveals no free fluid and patient hemodynamically stable.
- Risk/benefit ratio involving the patient; agree upon CT non-contrast

**Clinical Case: “Peter”**

- CT (-) reveals: 6 mm right ureteral stone; AAA stable in size and contour with “no signs to suggest rupture”
- “Given this and alternate diagnosis, we opted not to continue with CTA.”
Clinical Case: “Peter”

- Discharged home with hydrocodone, urine strainer, urology follow up, return precautions
- Code status discussed and documented
- 3 months later: still alive; still no AAA repair

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Take Home Points

- Your history and physical are valuable.
- Serum biomarkers can help you AND hurt you.
- Don’t CT scan everyone!
Thanks!

• Questions?
• Question box me, or
• brian.lin@kp.org
• Follow me on Twitter: bwlin720