Aortic Dissection: Radiologic Findings

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Mr. JB’s chest pain

• 80-year-old white male visiting his wife, who was scheduled for surgery, at BIDMC
• Sudden onset of heavy, 8/10, substernal chest pain
• Radiated from his mid-sternum to his jaw and to his left shoulder and arm
• Tingling of his left arm
• Right eye blurriness
• No radiation of pain to the back, no SOB
Mr. JB’s H and P

- HTN
- Bradycardia s/p pacemaker
- Stable abdominal aortic aneurysm
- On Norvasc and HCTZ
- Father died of AAA rupture. Brother treated for AAA rupture.
- Vitals: T 96.1, P 57, BP 94/50, R 16, O2 95% RA
DDx- sudden onset chest pain

- Cardiac (MI, angina)
- Vascular (aortic dissection, PE)
- Pulmonary (pneumothorax)
- GI (GERD, esophageal spasm)
- MSK (costochondritis)
Mr. JB’s DDx

- Cardiac (**MI, angina**)
- Vascular (**aortic dissection, PE**)
- Pulmonary (**pneumothorax**)
- GI (**GERD, esophageal spasm**)
- MSK (**costochondritis**)
Mr. JB’s CXR

“apparent widening of the right superior mediastinum”

“underlying vascular injury/dissection cannot be excluded”
DDx- Widened Mediastinum

- Achalasia
- Neoplasm
- LAD
- Hematoma or Hemorrhage
- Vascular abnormality (e.g. dilated or tortuous aorta, aneurysm, dissection, coarctation, dilated SVC)

(Reeder, 1993)
Aortic Dissection on CXR

- Widening of the superior mediastinum
- Progressive widening of the aorta on serial films
- Left pleural effusion (Miller, 2001)
- According to the International Registry of Acute Aortic Dissection, 12.4% of patients have no abnormality on chest radiograph. (Hagan, 2000)
Mr. JB’s CTA

- R ventricle
- Ascending Aorta & Intimal Flap
- L atrium

Image courtesy of BIDMC
Mr. JB’s CTA

Aortic arch

Image courtesy of BIDMC
Mr. JB’s CTA

Image courtesy of BIDMC
What Information Is Needed?

- Presence of an aortic dissection
- Involvement of ascending aorta
Classification of Aortic Dissections

What Information Is Needed?

- Presence of an aortic dissection
- Involvement of ascending aorta
- True vs. False lumen
Identifying the True Lumen

- Location of calcifications
- “Beak” or “Claw” sign

Image courtesy of BIDMC
Identifying the True Lumen

- Differing opacification times

Patient 2

![Image A](image_a.png)

![Image B (seconds later)](image_b.png)

Images courtesy of Neil Rofsky, M.D.
Can you find the true lumen?

Patient 3

Image courtesy of BIDMC
Can you find the true lumen?

Patient 3

True Lumen

Image courtesy of BIDMC
What Information Is Needed?

- Presence of an aortic dissection
- Involvement of ascending aorta
- True vs. False lumen
- Extent of dissection
- Sites of entry and re-entry
- Involvement of branch vessels
- Aortic insufficiency
- Pericardial effusion (Cigarroa, 1993)
Comparison of Modalities for AD Diagnosis

- CT
- MRI
- TEE
Pros and Cons of CT

Pros:
• Noninvasive
• Equipment generally available on an emergent basis
• Operator IN-dependent
• Helpful for identifying other causes of mediastinal widening

Cons:
• Requires IV contrast
• Sensitivity: 94%, Specificity: 87% (Nienaber, 1993)
MRI

Image courtesy of Neil Rofsky, M.D.
Pros and Cons of MRI

Pros:
• Sensitivity: 98%, Specificity: 98% (Nienaber, 1993)
• Noninvasive and no IV contrast required
• Multiple planes of view help with dx
• Cine-MRI can identify aortic insufficiency

Cons:
• Contraindicated for some patients
• Patients are relatively inaccessible during the MRI
• MRI may not be available emergently
Transesophageal Echo

Pros and Cons of TEE

Pros:

• Sensitivity: 98%, Specificity: 77%  \(\text{(Nienaber, 1993)}\)
• Widely available at the bedside
• Doppler can identify aortic insufficiency

Cons:

• Semi-invasive
• Operator dependent
• Image quality comparatively poor for surgical planning
Summary: Dx Aortic Dissection

- Choose modality (TEE, CT, or MRI) based on availability and expertise
- Identify an intimal flap
- Type A or Type B dissection?
- Which is the true lumen?
  - intimal calcifications
  - “beak” or “claw” sign
  - differing times to opacification
References

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