CT and MRI in Aortic Diseases

Daniel Ocazionez, MD
Assistant Professor
Department of Diagnostic and Interventional Imaging
The University of Texas Medical School at Houston
Nothing to Disclose
CT/CTA

- Faster acquisition (emergency situation)
- Isotropic spatial resolution. Evaluation of extravascular structures.
- Better for evaluation of calcium
- Multiple planes. 3D volume rendering
- Radiation

**Contraindications:**
- Iodine allergies
- Renal failure
MR/MRA

• No radiation
• EKG gated multiplanar imaging.
• Can be performed with and without intravenous contrast.
• Flow analysis
• Longer scanning times and technical expertise.
• Non emergent setting
• Contraindications:
  – Claustrophobia
  – MR unsafe devices
  – GFR less than 30 (Risk of Nephrogenic Systemic Fibrosis with IV gadolinium)
Anatomy

• Ascending aorta: Aortic valve to the origin of innominate artery.
• Aortic Arch: Innominate artery to ligamentum arteriosum.
• Descending thoracic aorta: Ligamentum arteriosum to diaphragmatic hiatus.
• Abdominal aorta
Aortic Aneurysm

• Maximal aortic diameter:
  – Ascending thoracic aorta: >4 cm
  – Descending thoracic aorta: >3 cm
  – Abdominal aorta: >2-3 cm

• Aortic Aneurysm Size Criteria:
  – Ascending: >5 cm
  – Descending: >4 cm
  – Abdominal: >3 cm
Ascending Aortic Aneurysm (5.4 cm)
Aortic Aneurysm

• **Etiologies:**
  – Atherosclerosis
  – Cystic medial necrosis with predilection of the aortic root (Anuloaortic Ectasia):
    • Marfan
    • Ehlers- Danlos
    • Bicuspid aortic valve
    • Osteogenesis Imperfecta
    • Syphilis
Marfan Syndrome
Acute Aortic Syndromes

• **Aortic Dissection:**
  – Intimal flap separating true and false lumen.

• **Intramural Hematoma:**
  – High attenuation crescentic thickening of the aortic wall.

• **Penetrating atherosclerotic ulcer:**
  – Localized ulceration penetrating through aortic intima into aortic wall.
Type A Aortic Dissection CTA
Type B Aortic Dissection MR
Traumatic Aortic Rupture
Feared Complications of type A dissection

• Extension to coronary arteries: Acute MI
• Extension to carotids: Stroke
• Pericardial rupture: Tamponade
• Aortic valve rupture with acute insufficiency.
Type A dissection extending into the LAD
Intramural Hematoma
Clinical Scenario 1

• 56 year old man presents to the ED with acute onset ripping chest and abdominal pain. On physical exam BP of 80/50.

• What is the appropriate imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRA without contrast
  4. MRA with contrast
Clinical Scenario 1

- 56 year old man presents to the ED with acute onset ripping chest and abdominal pain. On physical exam BP of 80/50.
- What is the appropriate imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRA without contrast
  4. MRA with contrast
Clinical Scenario 2

• 29 year old woman with history of Marfan syndrome, here for follow-up of thoracic aortic aneurysm.

• What is the appropriate initial imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRI/MRA
Clinical Scenario 2

• 29 year old woman with history of Marfan syndrome, here for follow-up of thoracic aortic aneurysm.

• What is the appropriate initial imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRI/MRA
Clinical Scenario 3

• 49 year old man with history of bicuspid aortic valve and ESRD who presents with subacute chest pain.

• What is the appropriate initial imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRA with gadolinium
  4. MRA without contrast
Clinical Scenario 3

• 49 year old man with history of bicuspid aortic valve and ESRD who presents with subacute chest pain.
• What is the appropriate initial imaging modality?
  1. CT chest without IV contrast
  2. CTA chest with IV contrast
  3. MRA with gadolinium
  4. MRA without contrast
Thank You