Blunt Thoracic Aortic Trauma

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Aortic Trauma

- Rapid deceleration injury
  - 70% result from motor vehicle accidents
  - Falls and a few crush and blast injuries
- Imaging Modalities
  - CXR-Chest CT-Aortogram
- Free rupture-rapidly fatal
  - Grossly widened mediastinum, +hemothorax, hemodynamic instability
- Controlled rupture- up to 90% survival
  - No hemothorax, hemodynamiclly stable

Simon: Factors predicting Early In-Hospital Death in Blunt Thoracic Aortic Injury, J Trauma, 2001, 51(5): 906-911
Patient 1

- 84 year old female
- Motor vehicle accident
- Unrestrained passenger
- Loss of Consciousness
- Death of driver

Chest Radiograph

Widened mediastinum
Indistinct aortic arch

Image courtesy Joseph Makris, M.D./BIDMC
Differential Diagnosis for A Widened Mediastinum

• Traumatic
  – Traumatic aortic rupture
  – Pseudoaneurysm
  – Rupture of other mediastinal vessels
  – Collapse of upper lung
  – Mediastinal hematoma

• Non-Traumatic
  – Aneurysm
  – Lymphoma
  – Tumors
  – Right aortic arch
  – Cysts
  – Esophageal lesions
Chest Radiographs in Aortic Trauma

- Mediastinal ratio > 0.25
- Mediastinal widening
- Indistinct aortic arch contour
- NG tube displaced to Right
- Left apical cap
- Fractured 1st and 2nd ribs

Sen  Spec
95   75
75   26
75   5
67   68
37   58
17   70

Kadir S: Diagnostic Angiography 1986

Image courtesy Joseph Makris, M.D./BIDMC
Patient 1  CT

Aortic disruption at the Level of the arch

Small intimal hematoma

No evidence of active Extravasation of contrast

No pneumothoraces

Image courtesy of Joseph Makris, M.D./BIDMC
Patient 1 Sagittal Reconstruction

Image courtesy of Joseph Makris, M.D./BIDMC
Most Frequent Site of Aortic Trauma

Distal to L subclavian at the level of the Ligamentum Arteriosum

Thoracic Aortogram Patient 1

Images courtesy Joseph Makris, M.D./BIDMC
Patient 2 Chest Radiograph

- 25 year old male
- High speed MVA
- Question loss of Consciousness
- CXR
  - Trauma board artifact
  - Left lateral chest wall not included on the film
  - Inadequate film

Left apical cap?
Patient 2  CT

- Study by Demetriades et al. in Archives of Surgery 1998
  - Plain film sensitivity 55%
  - Helical CT sensitivity 100%

- Recommend CT of all patients with mechanism suggestive of aortic trauma

Image courtesy of Joseph Makris, M.D./BIDMC

Demetriades et al., Archives of Surgery, 133(10), October 1998, 1084-1088
Patient 2 Aortogram

- Diagnosis: Aortic Tear
- Angiography remains gold standard
- Invasive
- Often only utilized if CT indeterminate
- May be therapeutic if severe pelvic fracture

Image courtesy of Joseph Makris, M.D./BIDMC
Patient 3  Chest Radiograph

- 23 year old female
- High speed MVA
- Intubated
- CXR
  - Allowing for technique
  - No gross abnormalities

Image courtesy of Joseph Makris, M.D./BIDMC
Patient 3  CT

- Soft tissue density within prevascular fat
- Mediastinal hematoma cannot be ruled out
- Fake outs
  - Residual thymus
  - Aortic calcification
  - Ductus Bump

Image Courtesy of Joseph Makris, M.D./BIDMC
Patient 3 Aortogram

• Normal Aortogram
• No evidence for dissection

• Diagnosis
  – Residual thymus in a young patient

Image courtesy of Joseph Makris, M.D./BIDMC
Radiology of Aortic Trauma

- Suspected in any high speed deceleration trauma
- CXR
  - Normal
  - Mediastinal index > 0.25
  - Widened mediastinum
  - Indistinct aortic contour
- CT
  - Regardless of CXR findings
- Aortogram
  - If CT indeterminate
- Fake out-thymus, calcification, ductus bump

Image courtesy of Joseph Makris, M.D./BIDMC
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References


Kadir S. Diagnostic Angiography, Philadelphia: WB Saunders, 1986
