Objective

1. To define traumatic aortic injury and review its mechanism
2. To describe the radiographic and CT features of traumatic aortic injury

Tears may involve 1, 2, or 3

Intima

Adventitia

Lumen

Traumatic Aortic Injury (TAI)

Disruption or partial tear of the aortic wall

Synonyms

- Acute traumatic aortic injury (ATAI)
- Blunt traumatic aortic rupture (BTAR)
- Blunt aortic trauma (BAT)
- Blunt aortic injury (BAI)

Etiology

Usually blunt trauma

MVC

MCC
Clinical

No specific sign or symptom

Chest pain & dyspnea most common

Prognosis

- 80-90% dead on arrival
- 50% mortality if untreated in 24 hrs
- Cause of death in 20% high speed MVC

Mechanism of TAI

Rapid deceleration
Shearing forces
Aortic root
Lig arteriosum
Diaphragm

Mechanism of TAI

Osseous pinch
Chest wall & Spine

Mechanism of TAI

“Water hammer effect”
rapid increase in pressure
during compression

Mechanism of TAI

Probably multi-factorial
shearing, stretching,
twisting & hydrostatic
**Imaging features of TAI**

1. CXR
2. CT

**AP Supine CXR**
- Wide superior mediastinum
  - >8cm or >25% of transthoracic diameter
- Abnormal contour of aortic arch
- AP window obscured
- Left apical cap
- Rightward shift of trachea, ETT, NGT
- Wide paravertebral/paratracheal stripe
- 7% are normal

**CT**
- 98 - 100% sensitivity
- What protocol should be used?

**Trauma Protocol?**
- CT protocols
  - 98 - 100% sensitivity
  - What protocol should be used?

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**CT Scan Technical Protocols**

This section is a list of the CT protocols for examinations performed at Rhode Island Hospital affiliated with Brown Medical School.

Quick Links:
- Trauma Protocol
- Thorax & Abdomen
- Brain & Spine

Choose a section by clicking on the appropriate body part below or use the links to the right:

- Head
- Body
- Thorax & Spine
- Abdomen & Pelvis
- Musculoskeletal Studies

*Subject: CT Scan Technical Protocols*
**CT I+**
- Periaortic hemorrhage / contrast extravasation
- Mediastinal hematoma
- Pseudoaneurysm
- Contour abnormality, irregularity
- Intimal flap

**CT TAI**

<table>
<thead>
<tr>
<th>Location</th>
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<tbody>
<tr>
<td>90% Aortic isthmus</td>
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<tr>
<td>8% Ascending aorta</td>
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<tr>
<td>2% Distal descending aorta</td>
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**Treatment**

Isolated intimal injury may resolve "minimal aortic injury"

- Endovascular stent graft
  - Technical success up to 100%
- Surgical interposition graft
  - 70-85% survival
  - Up to 20% surgical mortality

**Pedestrian vs Truck**

**Ascending Aorta**

66 yo female MVC
- Disruption ↑
- Dilated Aorta
- Hemorrhage ↓

**Ascending Aorta**

66 yo female MVC
- Tamponade → OR
- Low porosity graft
AP supine

59 M MVC
Fractures
Diaphragm rupture
Wide superior mediastinum
Abnormal contour of arch
AP window obscured
Left apical cap
Rightward shift of trachea

Isthmus Disruption

59 M MVC

Post Treatment

59 M MVC
Stent graft

AP Supine

24 M head on MVC
Wide superior mediastinum
Abnormal contour of arch
AP window obscured
Left apical cap
Rightward shift of trachea

TAI

24 M head on MVC
Intimal flap
Endovascular stent

Problem Solving

CT I+ ECG-Gated Angiogram
Penetrating TAI

Stab wound
Fever
† WBC
?
Empyema
US guided CT

Penetrating TAI

VIR

Not ideal patient to scan

Take home points

1. Traumatic Aortic Injury fatal in majority of cases
2. Patients that make it to the hospital should be diagnosed promptly
3. Findings of TAI on CXR and CT have been well described
4. Use cardiac gating & angiography for problem solving

References

Rosado-de-Christenson et al: Diagnostic Imaging Chest. Salt Lake City, Utah: Amirsys, 2012
Traumatic Aortic Injury

STR 2012
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