

# Thoracic Aortic Injuries

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Diagnostic Radiology RAD 4001

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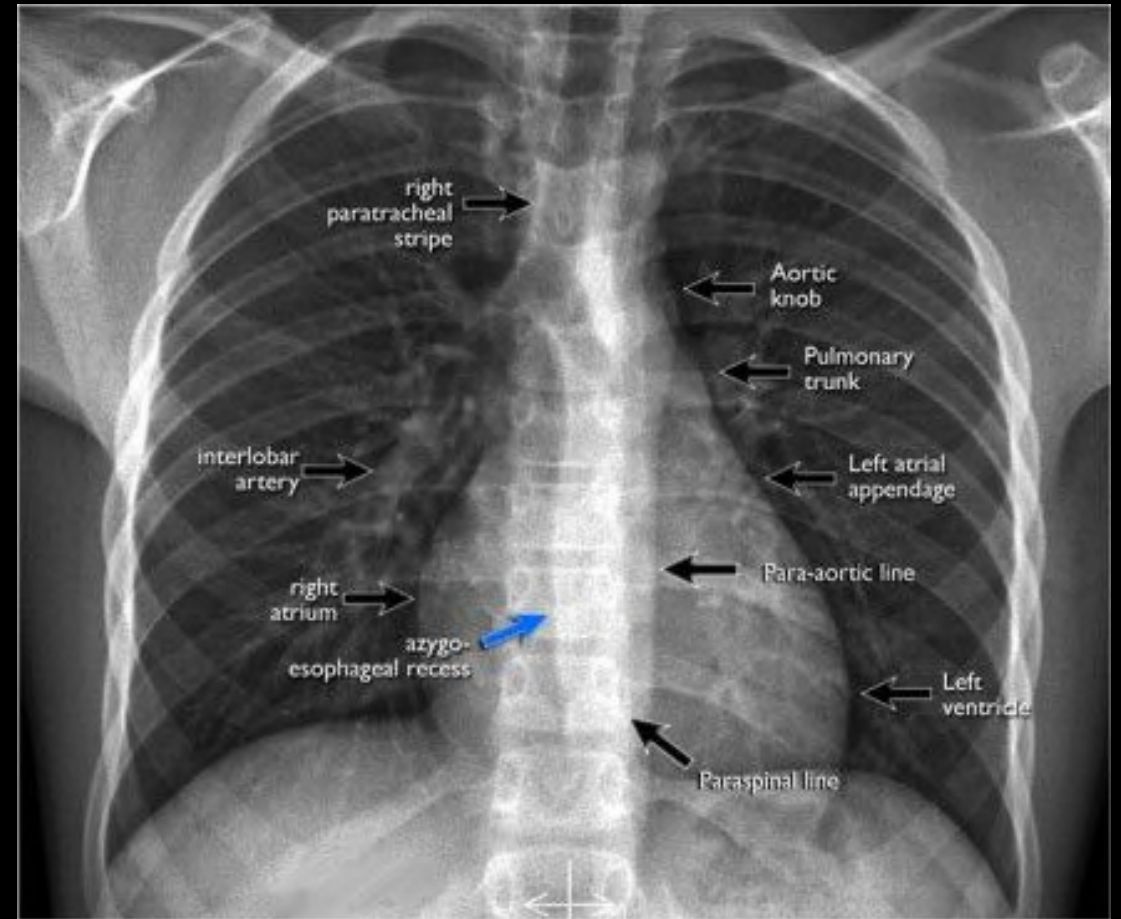
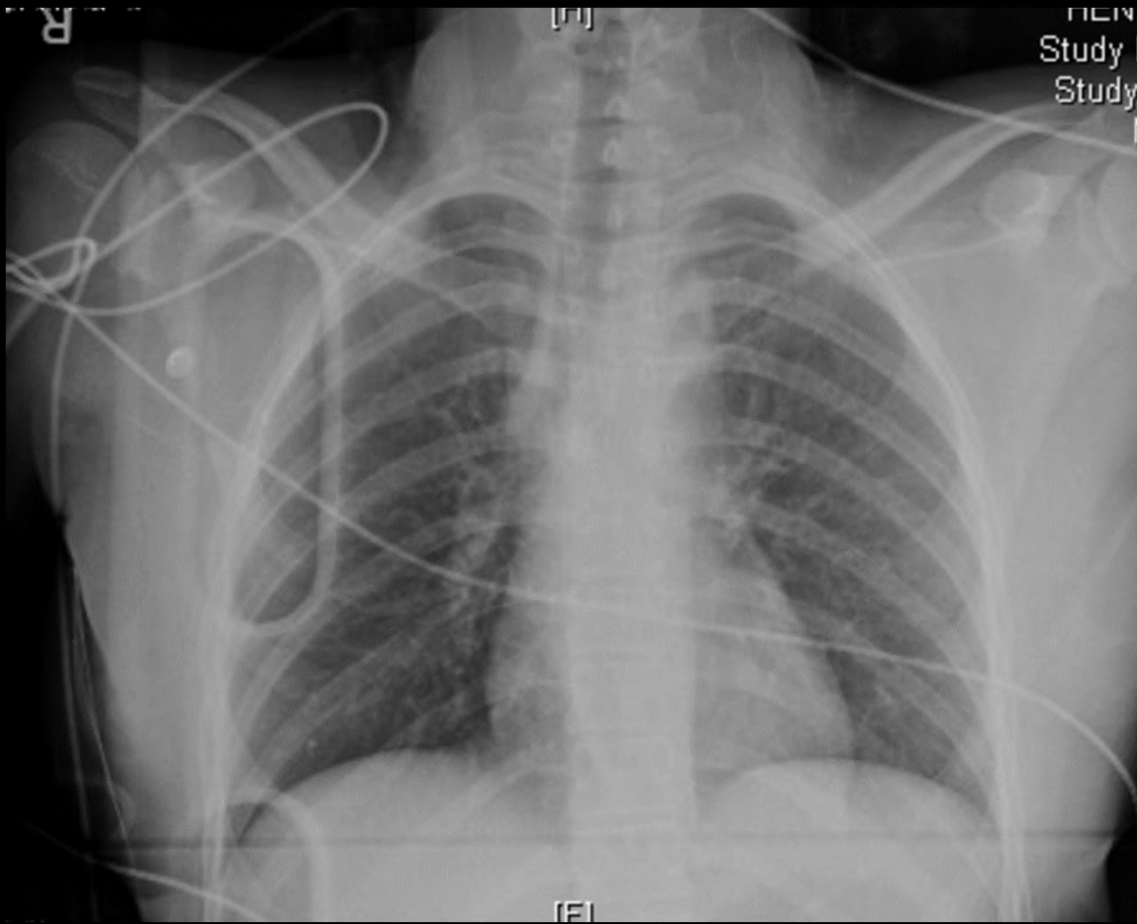
# History



- 19 year old Female presenting to the ED via life flight after a motor vehicle collision
- Vitals in trauma bay: BP: 86/45, HR: 145 bpm
- Patient was in uncompensated hypovolemic shock and central venous access was obtained for resuscitation
- Past Medical History: None
- Initial evaluation of injuries include: Left renal laceration, left superior/inferior pubic rami fracture, left iliac bone fracture, left femur fracture, aortic transection, extraperitoneal bladder rupture, splenic laceration

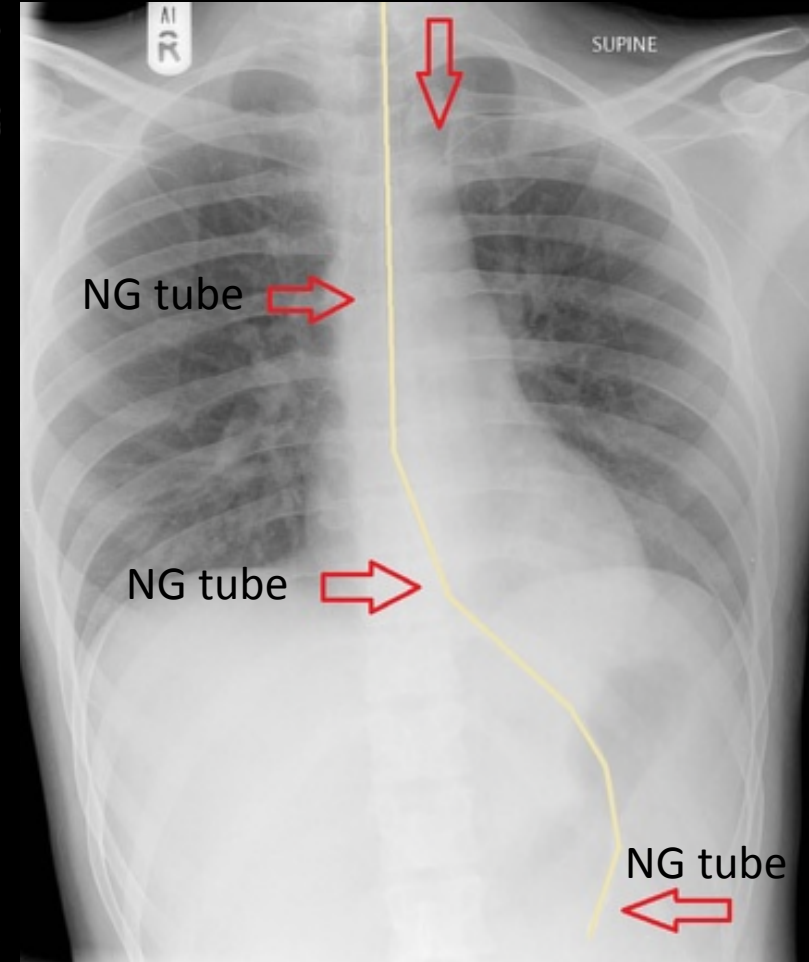
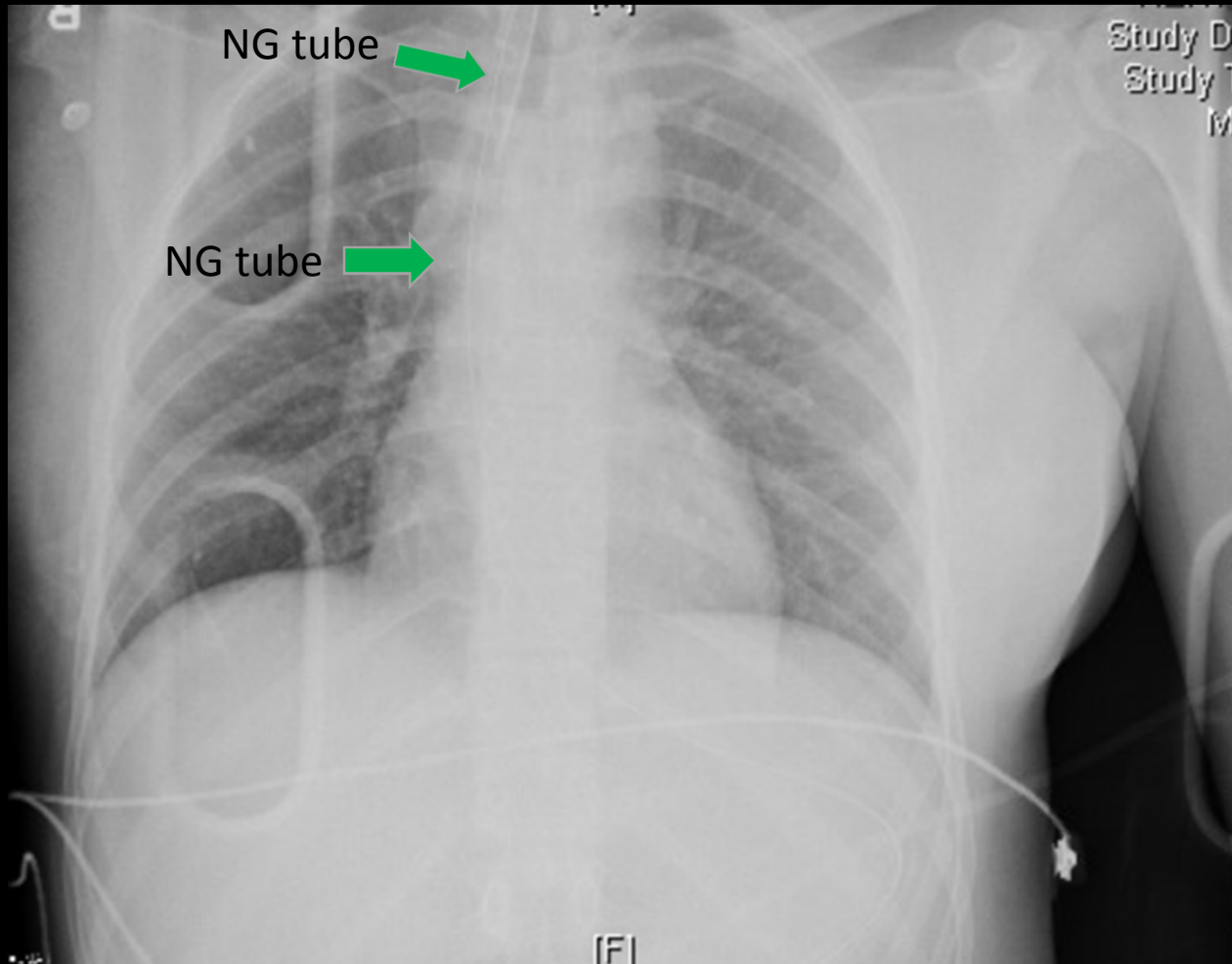
# Relevant Imaging

- Initial CXR deceptively normal

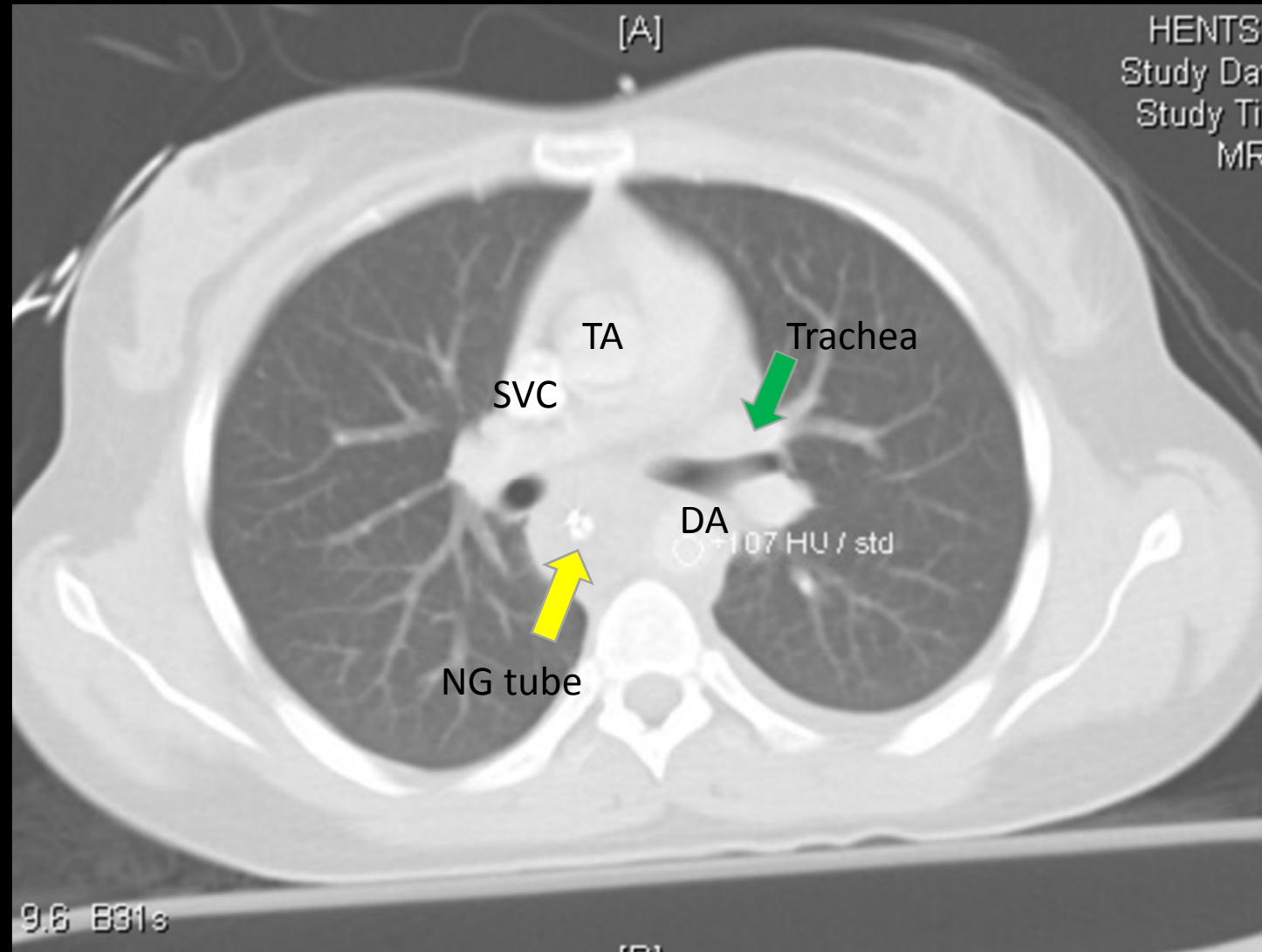


# Imaging Continued

- Follow up CXR to assess lines and tubes showed tracheal and nasogastric tube deviation to the right.

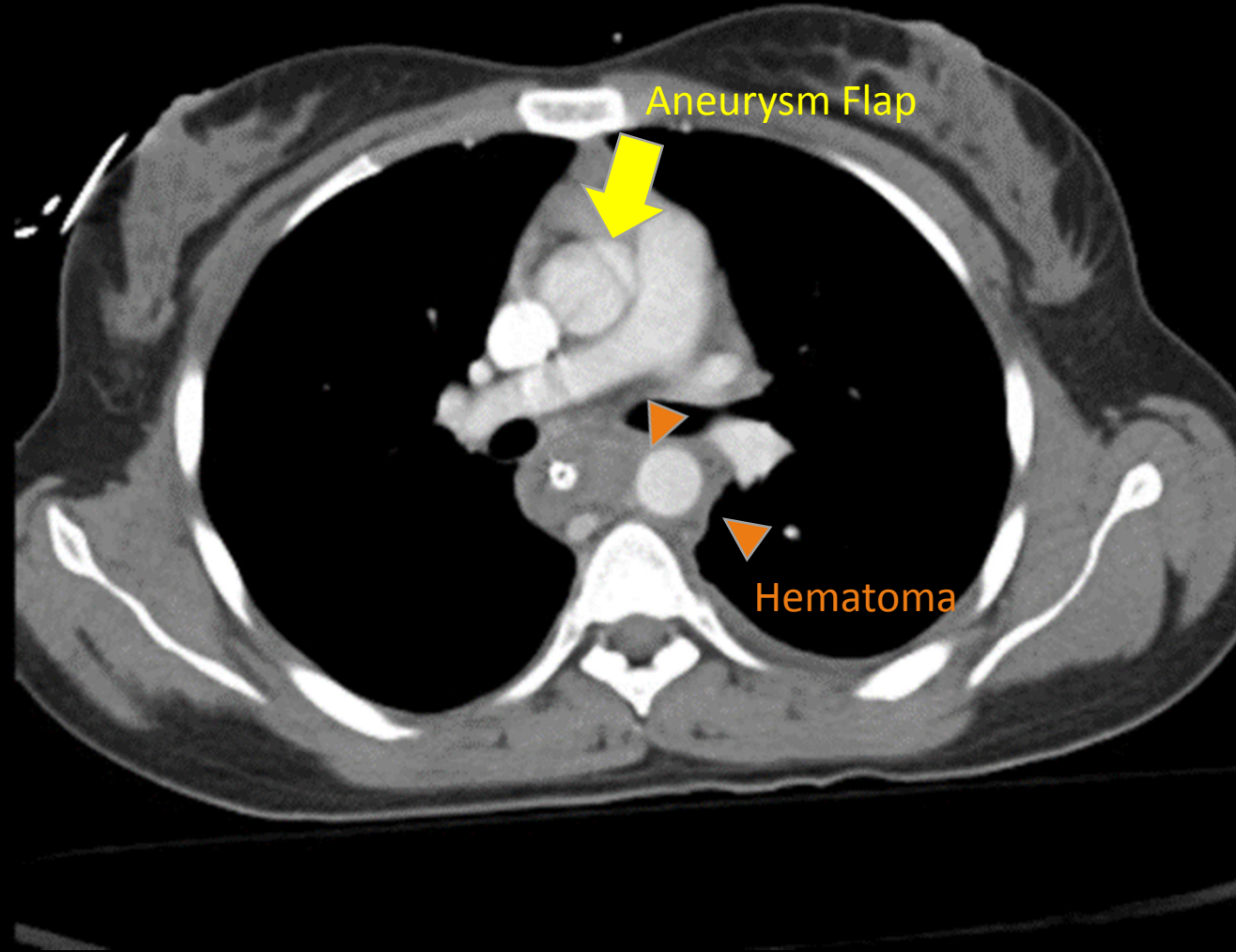


# CT chest/abdomen/pelvis with contrast axial

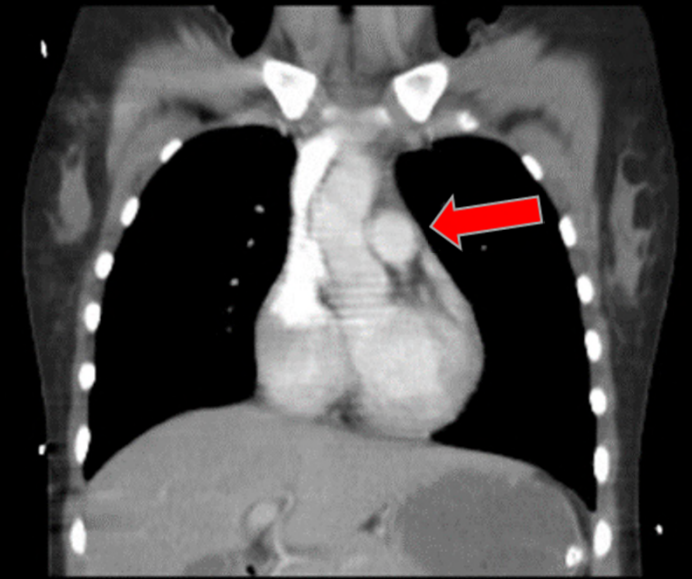
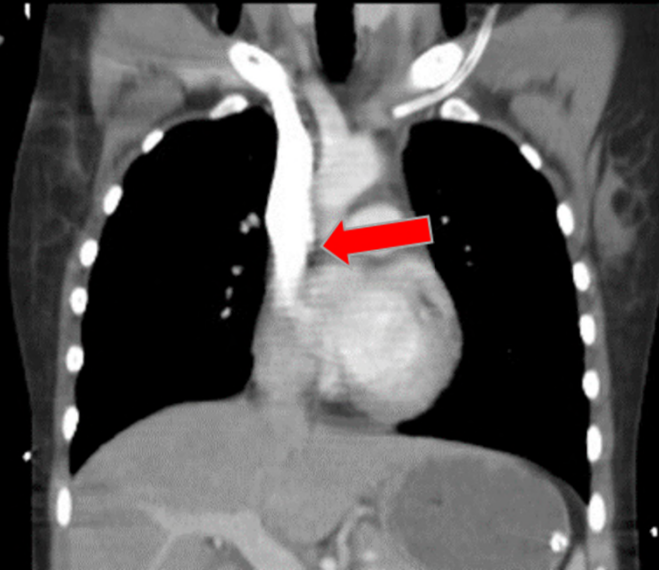
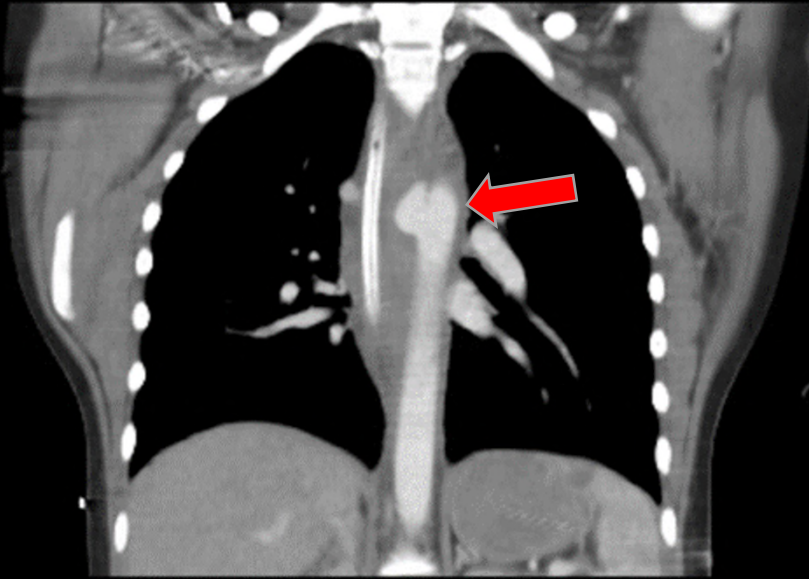


TA= Thoracic Aorta  
SVC= Superior Vena  
Cava  
DA= Descending  
Aorta

# CT chest/abdomen/pelvis with contrast axial

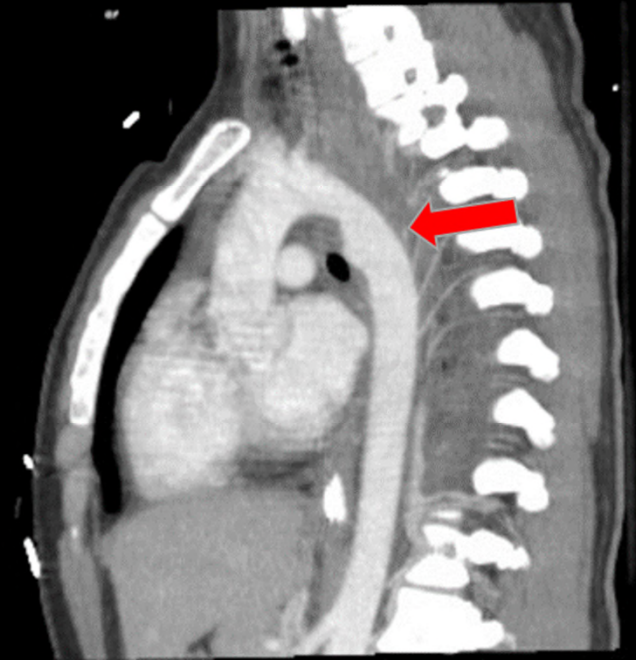
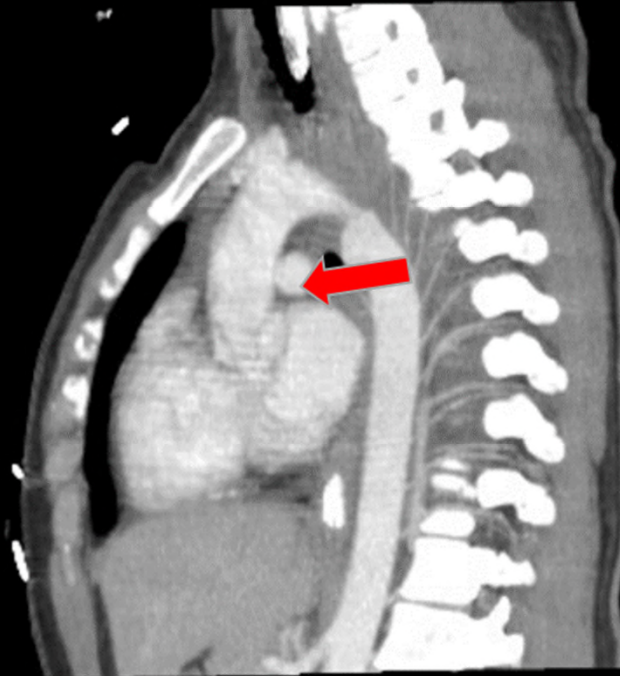
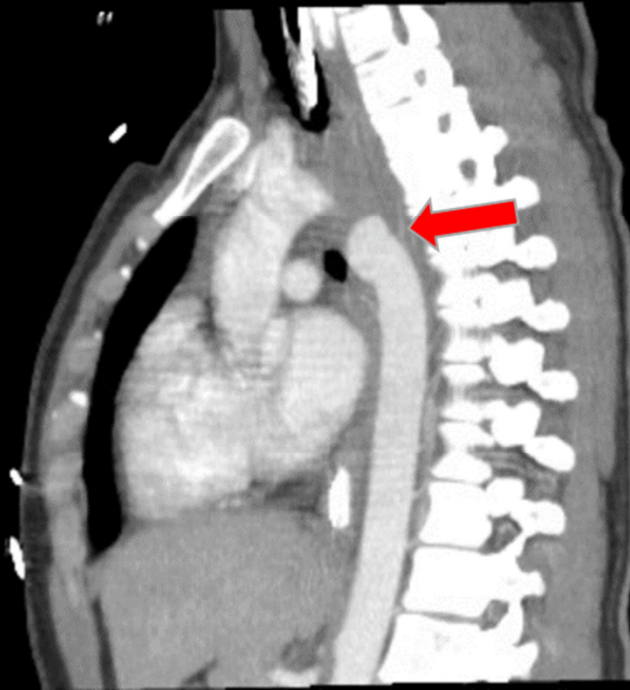


# CT Chest/Abdomen/Pelvis Coronal



Red arrow= Pseudoaneurysm

# CT Chest/Abdomen/Pelvis Sagittal



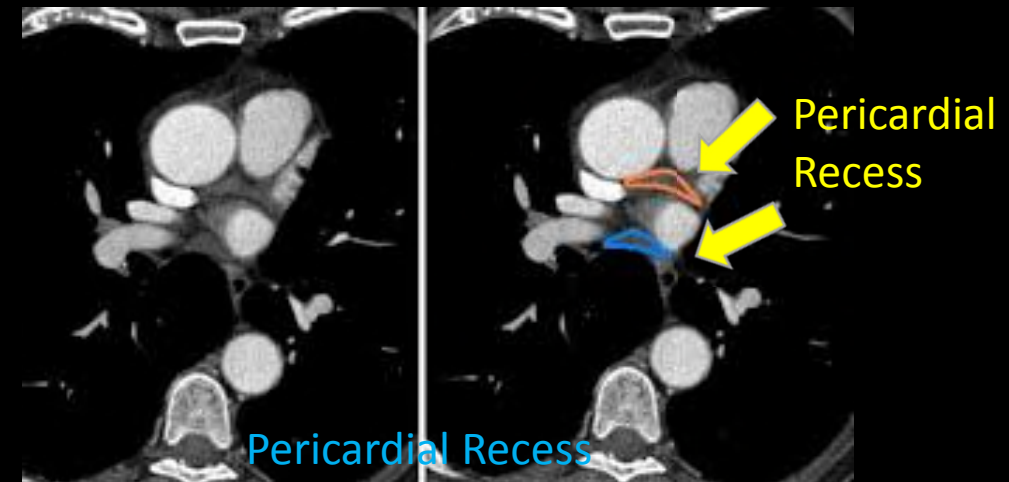
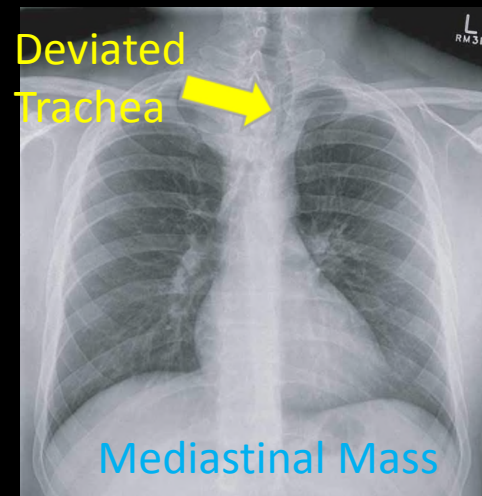
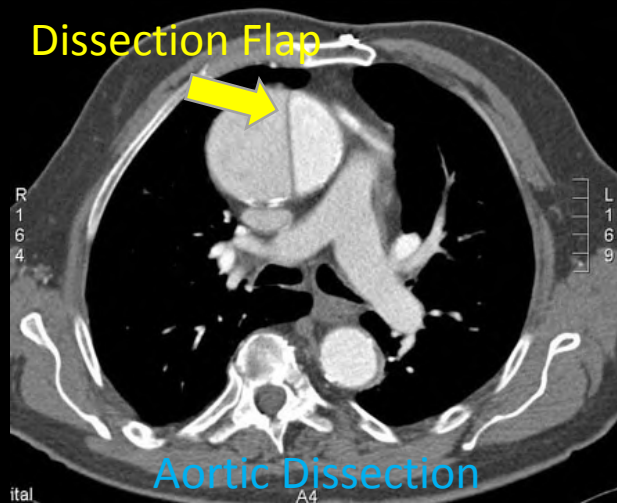
Red arrow= Pseudoaneurysm



- Imaging shows a traumatic thoracic aortic pseudo aneurysm with mediastinal hematoma causing tracheal deviation to the right.

# Differential Diagnosis

1. Aortic dissection- presents similar to a pseudoaneurysm on axial CT images.
2. Mediastinal mass- leading to shifting of structures within the mediastinum.
3. Pericardial recess- small spaces within the pericardial cavity arising from the transverse pericardial sinus, formed by the reflections of the pericardium. Fluid can pool in the recesses and mimic mediastinal pathology.

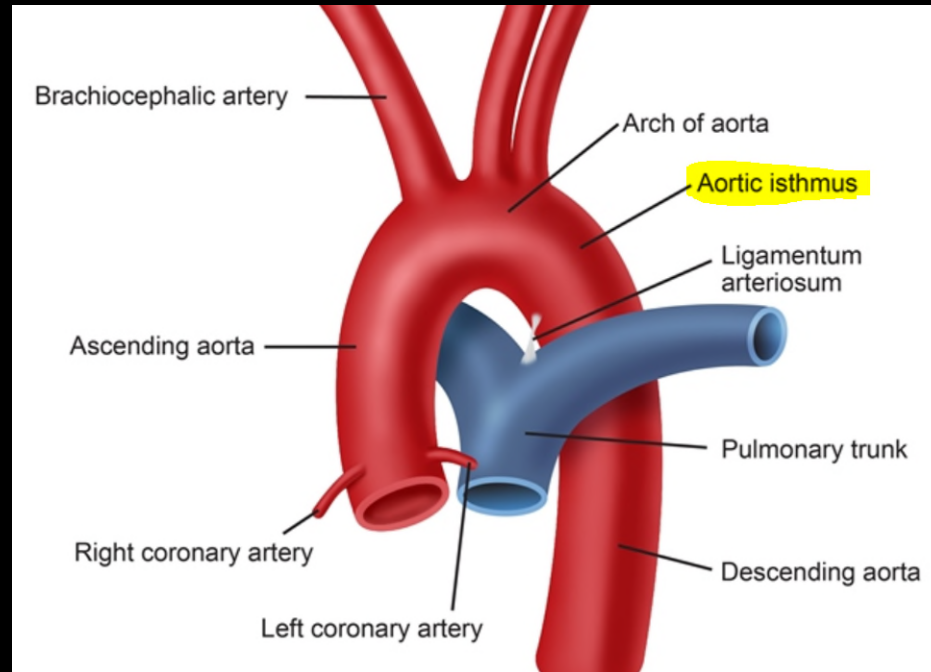


# Discussion

- Between 1.5-2% of patients with blunt thoracic trauma sustain aortic injuries.
- Traumatic (blunt) aortic injury often involves rapid deceleration, likely from a fall from height or motor vehicle collision, and can be life threatening.
- Early diagnosis is critical. 20% of patients who arrive to the hospital alive with blunt aortic injury die within 30 hours of injury from lethal rupture.

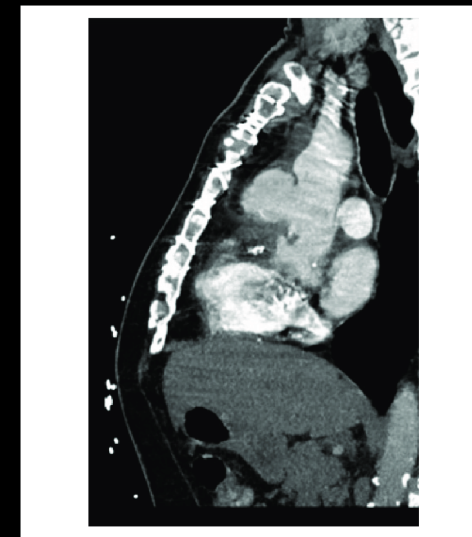
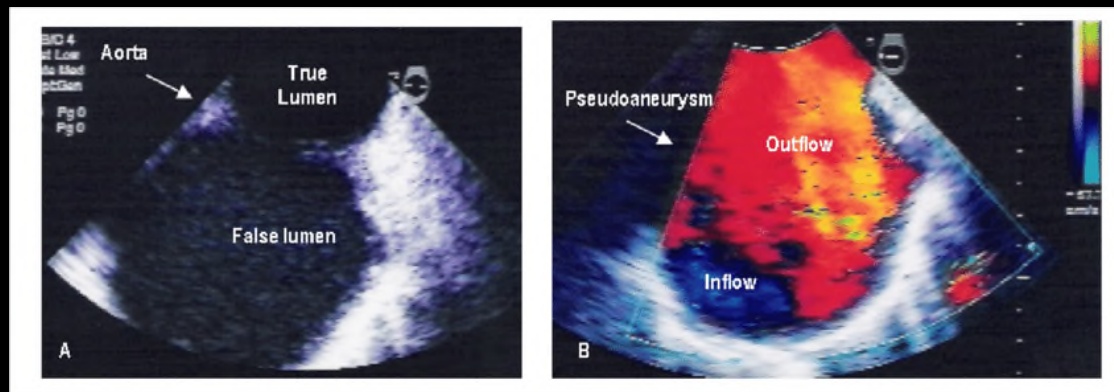
# Discussion

- The most common location is the aortic isthmus distal to left subclavian artery.
- This isthmus is the transition zone between the more mobile ascending aorta and arch, and the relatively fixed descending aorta, allowing for stretching with rapid deceleration.

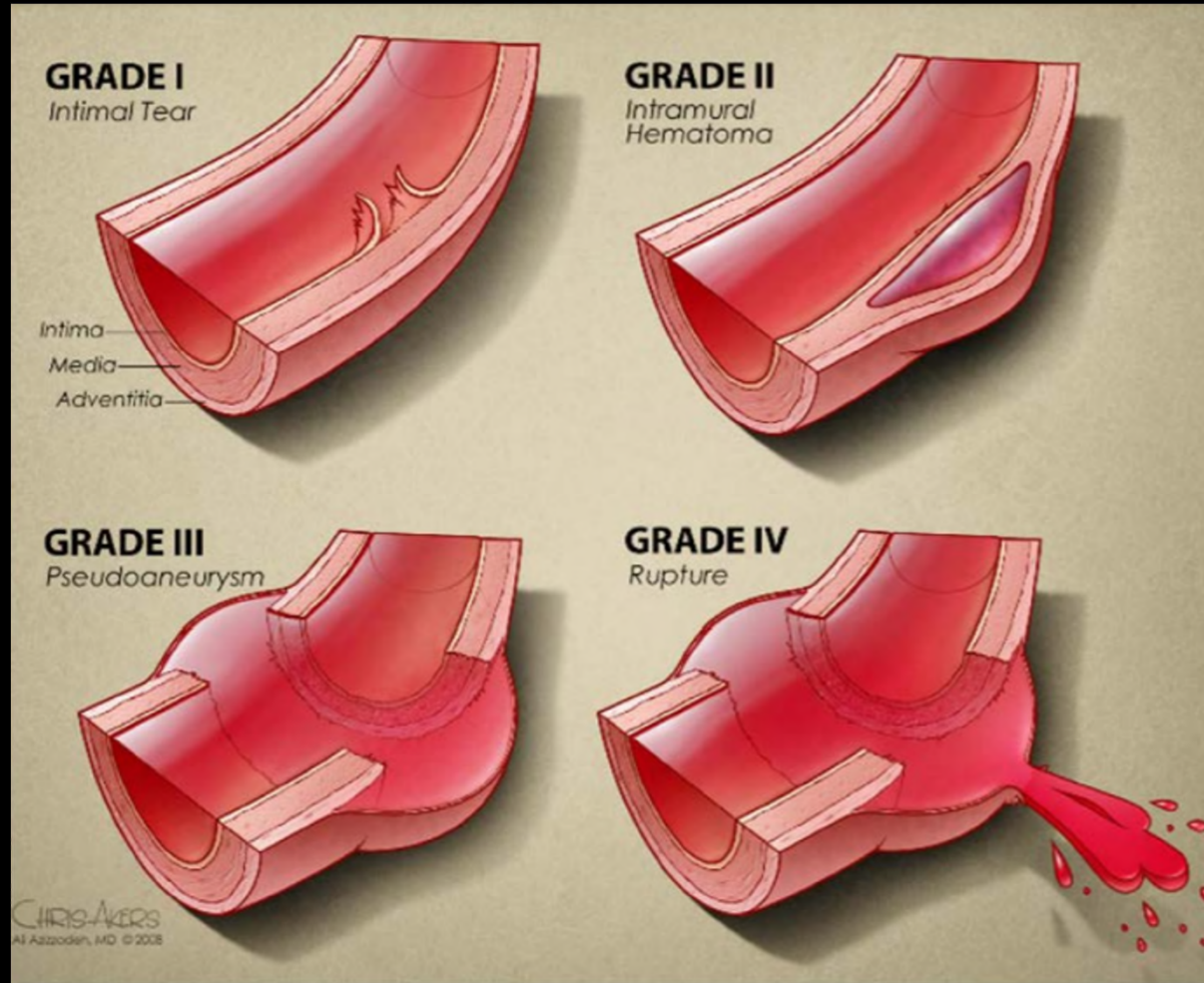


# Evaluation

- Initial evaluation includes a plain chest radiograph.
- CT angiography of the chest and TEE (transesophageal echocardiography) are the main imaging modalities used to diagnose blunt aortic injury if suggestive on clinical evaluation.
- CT angiography is recommended in hemodynamically stable patients, while TEE can be used in hemodynamically unstable patients who require prompt assessment.

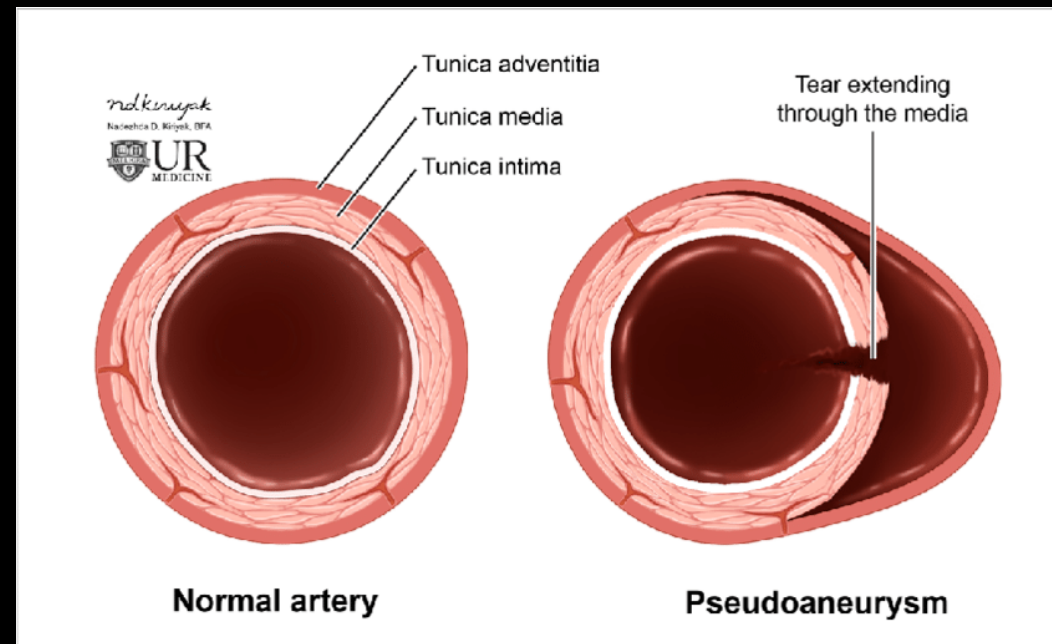


# Aortic Injury Grading



# Diagnosis

- This patient has a pseudoaneurysm as diagnosed on imaging; a collection of blood between the two outer layers of an artery, the tunica media and tunica adventitia.
- Due to the patients mechanism of injury and radiologic features, the diagnosis is a Grade 3 Traumatic Aortic Injury.



# Treatment

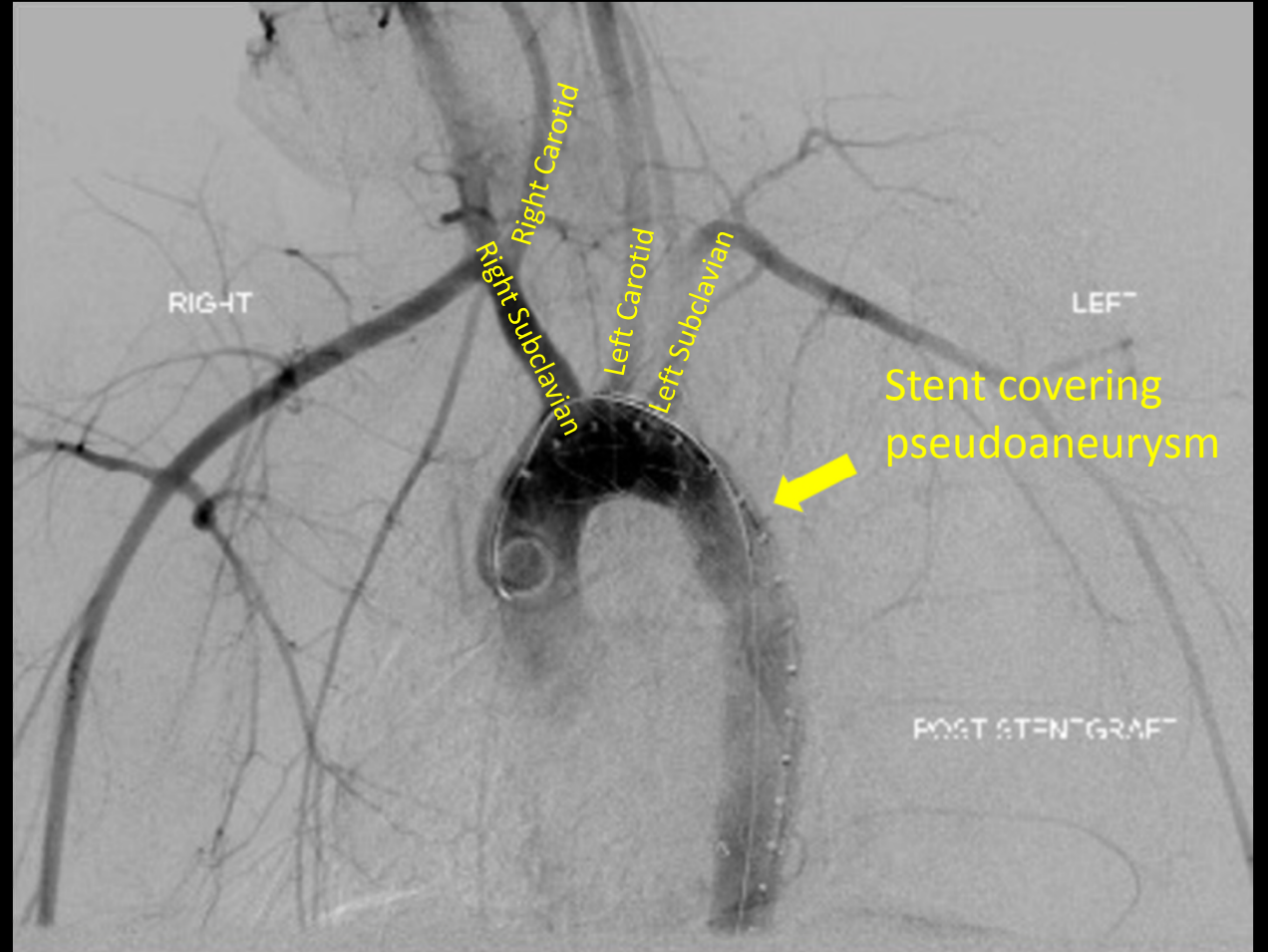
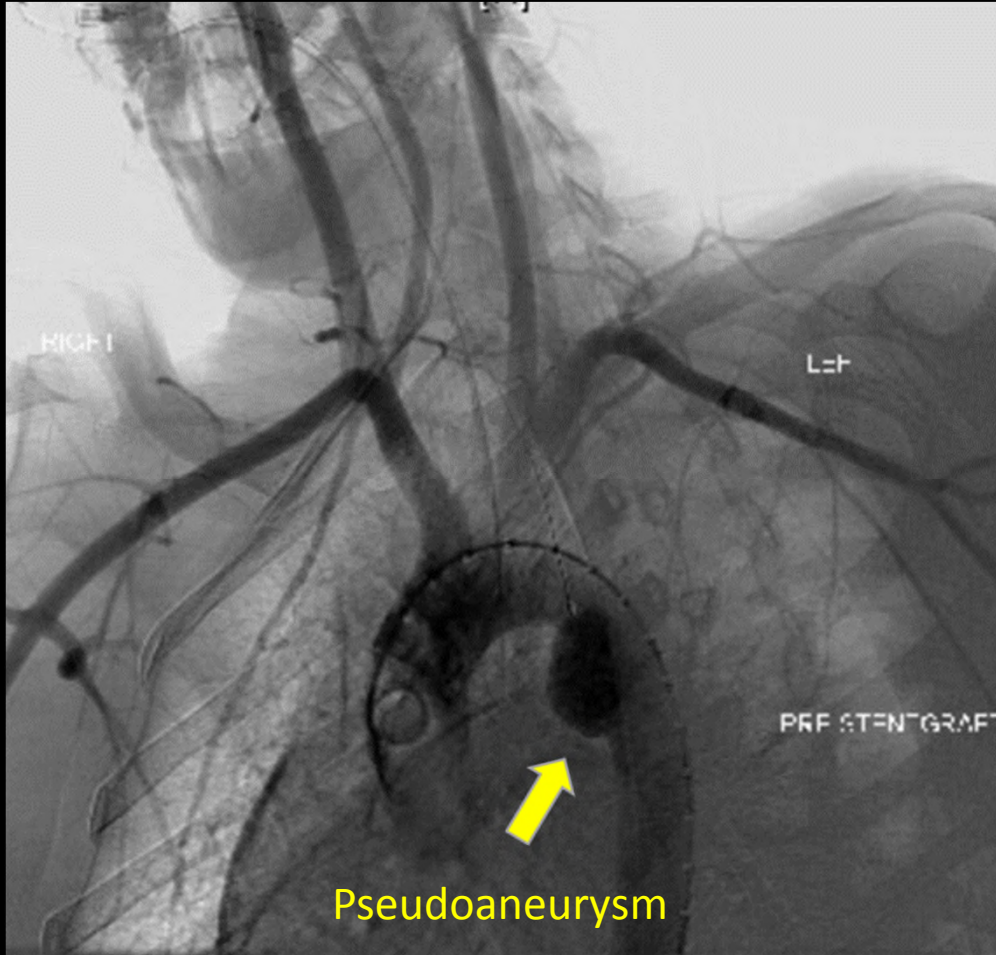
- Endovascular repair of the thoracic aorta is a minimally invasive approach that involves placing a stent-graft in the thoracic or thoracoabdominal aorta.
- Endovascular repair has significantly lower morbidity and mortality compared to open repair.
- CT angiography is used during the procedure to assess the aorta and fit an appropriately sized stent.



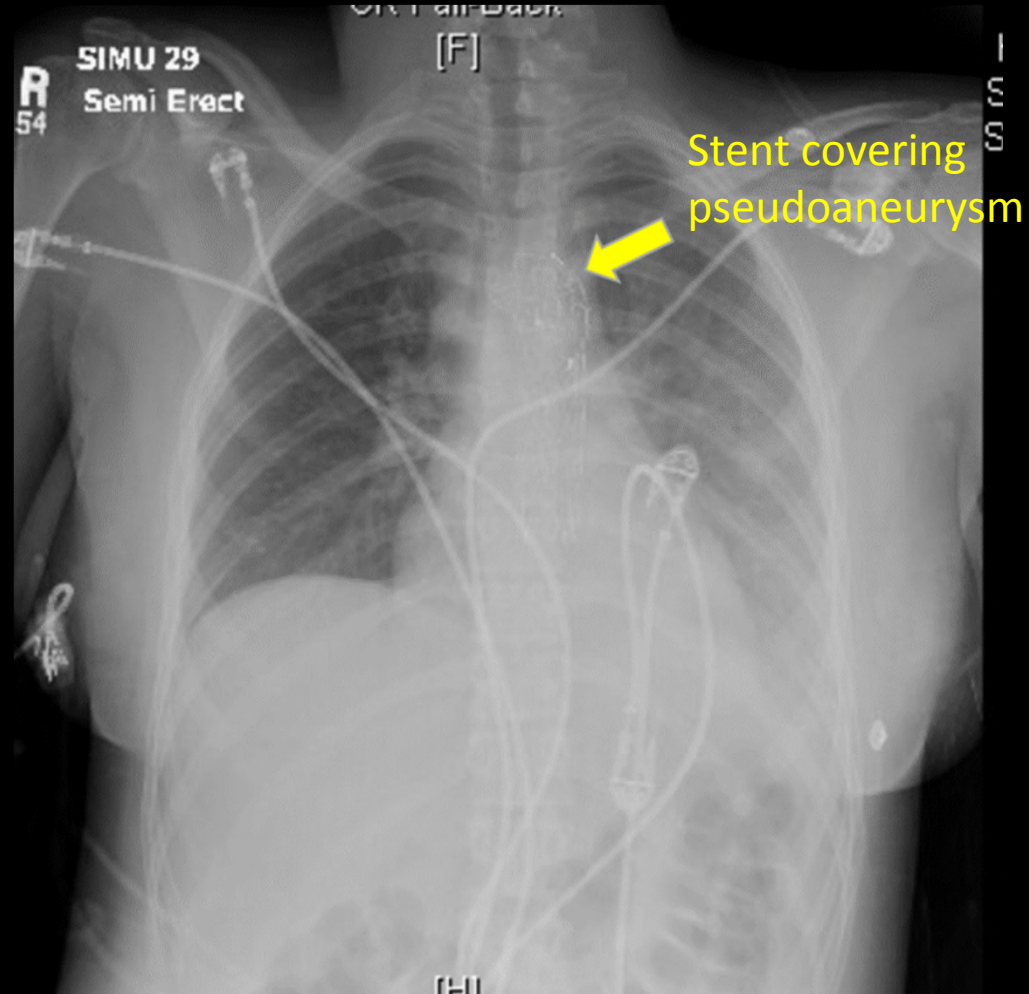
# Treatment

- The five year survival rate of emergent open thoracic aortic repair is 37%.
- Patient was treated with endovascular repair of pseudoaneurysm with coverage of left subclavian artery on June 2, 5 days after initial presentation.
- Other injuries: The following day (06/03), an exploratory laparotomy was performed due hemorrhagic shock with evacuation of hemoperitoneum and splenectomy.

# Treatment



# Treatment



# ACR appropriateness Criteria

Date of origin: 1995  
Last review date: 2014

## American College of Radiology ACR Appropriateness Criteria®

### Clinical Condition:

### Blunt Chest Trauma — Suspected Aortic Injury

Radiologic Procedure	Rating	Comments	RRL*
CTA chest with IV contrast	9	This is the diagnostic test of choice for suspected blunt aortic injury.	☼☼☼
X-ray chest	9	Radiographs are complementary to more definitive studies.	☼
MRA chest without and with IV contrast	7	This procedure should be performed on patients with contraindication to CTA.	○
Aortography thoracic	6		☼☼☼
CT chest without IV contrast	5		☼☼☼
US echocardiography transesophageal	5		○
MRA chest without IV contrast	5		○
<b><u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate</b>			<b>*Relative Radiation Level</b>

# Imaging Cost

- CXR= \$290 on average on United States
  - 5 CXR= \$1,450
- CT Abdomen/Pelvis w/ contrast= \$1,392
- Total imaging cost= \$2,482

# Take Home Points

- Blunt thoracic aortic injuries are most commonly caused by deceleration injuries.
- The isthmus is the most common site of injury.
- It is important to quickly recognize clinical signs of aortic injury in order to get appropriate imaging.
- Endovascular repair has an increased survival rate compared to open repair.

# References

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Questions?