

Splenic Injury and Pseudoaneurysms in a Traumatic Setting

Yakira Alford

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RAD 4001

Dr. Ronald Bilow



Clinical History

- 65-year old male involved in a motor vehicle accident
 - Restrained driver in driver-side collision going 40 mph; 12-inch intrusion, extrication required
 - Per EMS – GCS 10, + LOC,
 - LifeFlighted as a level 1 trauma for higher level of care
- Per EMS: GCS 10, +LOC
- Vital Signs in ED: Temp 98.5°F HR 118 bpm BP 122/50 mm Hg RR 22/min SpO2 100%
- Physical exam
 - Head: normocephalic, small laceration lateral to the left eye, abrasion with moderate hematoma to the left occipital region
 - Neuro: GCS 13, sensory/motor intact
 - Cardiovascular: Tachycardic, regular rhythm
 - Chest wall: Chest wall diffusely tender to palpation
 - Abdomen: soft, nontender, non-distended
 - Back: diffusely tender to palpation, no step-offs
- FAST negative

ACR appropriateness Criteria

Variant 2:

Major blunt trauma. Hemodynamically stable. Not otherwise specified. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
CT whole body with IV contrast	Usually Appropriate	☢☢☢☢☢
Radiography trauma series	Usually Appropriate	☢☢☢
US FAST scan chest abdomen pelvis	Usually Appropriate	○
CT whole body without IV contrast	May Be Appropriate	☢☢☢☢☢
Fluoroscopy retrograde urethrography	Usually Not Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	Usually Not Appropriate	○
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	○

Cost of Imaging at Memorial Hermann (Typical Charges)

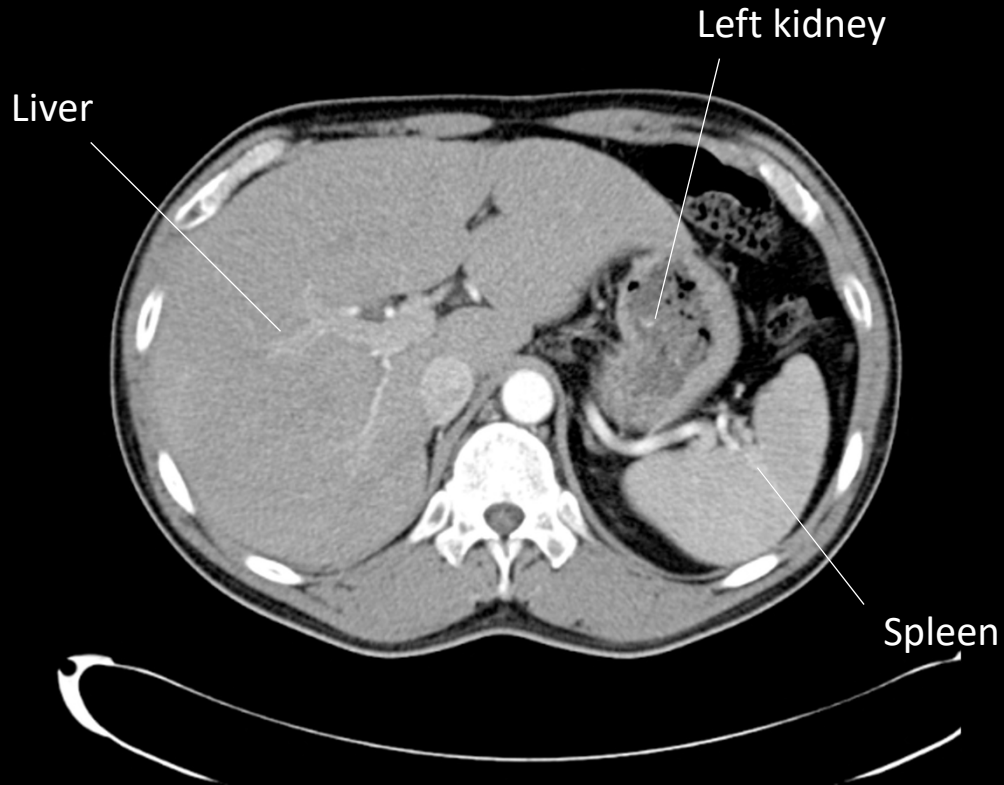
CT Chest w/ contrast	\$3,936
CT Pelvis/Abdomen w/ contrast	\$7,998
CT Brain w/o contrast (x4)	\$3,157 (x4)
CT Maxillofacial area w/o contrast	\$4,409
CT cervical spine w/o contrast	\$4,507
CT angiography neck w/ contrast	\$2,666
CT Right Tibula/Fibula w/o contrast	\$3,078
Total	\$39,222

Imaging – Full-Body CT Scan

- CT chest, abdomen and pelvis with IV contrast, 08/22/2019
 - Also Brain CT, CT Neck, CT cervical spine, CT Right Tibula and Fibula,
- Axial, sagittal, and coronal views obtained
- Arterial phase
 - 20-30 seconds after IV contrast administration
- Portal venous phase
 - 60-80 seconds after IV contrast administration
- Delayed phase
 - 6-10 minutes after IV contrast administration

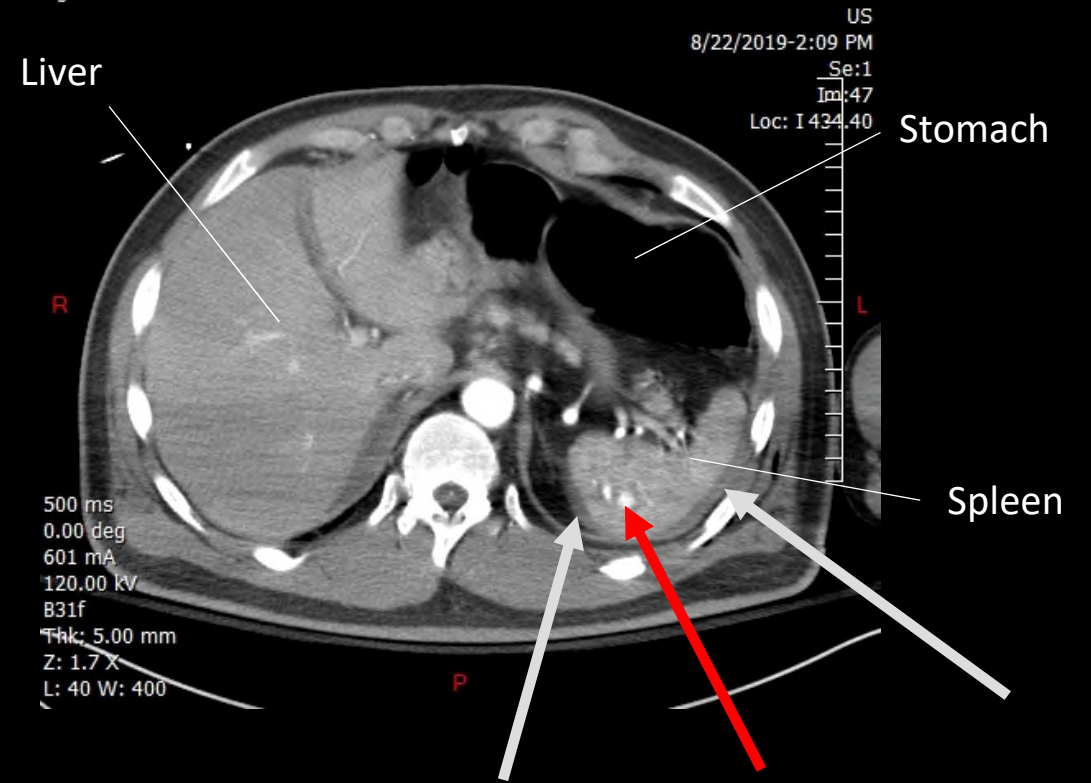
Imaging – CT Scan (Abdomen)

Normal

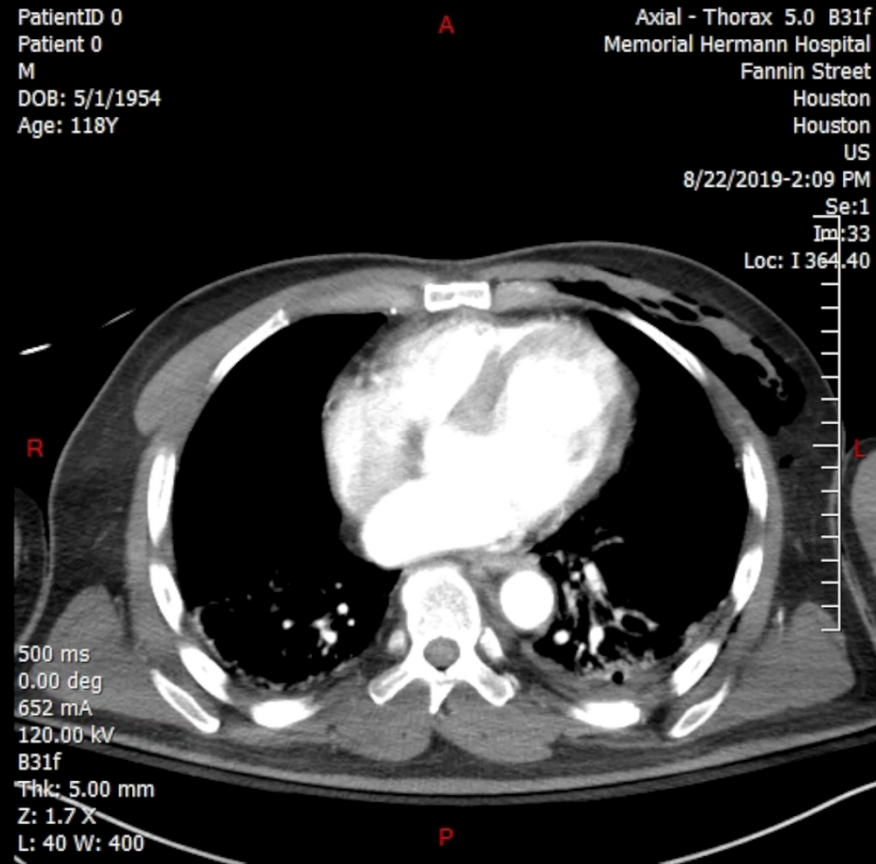


<https://ddxof.com/ct-interpretation-abdomenpelvis/>

Abnormal

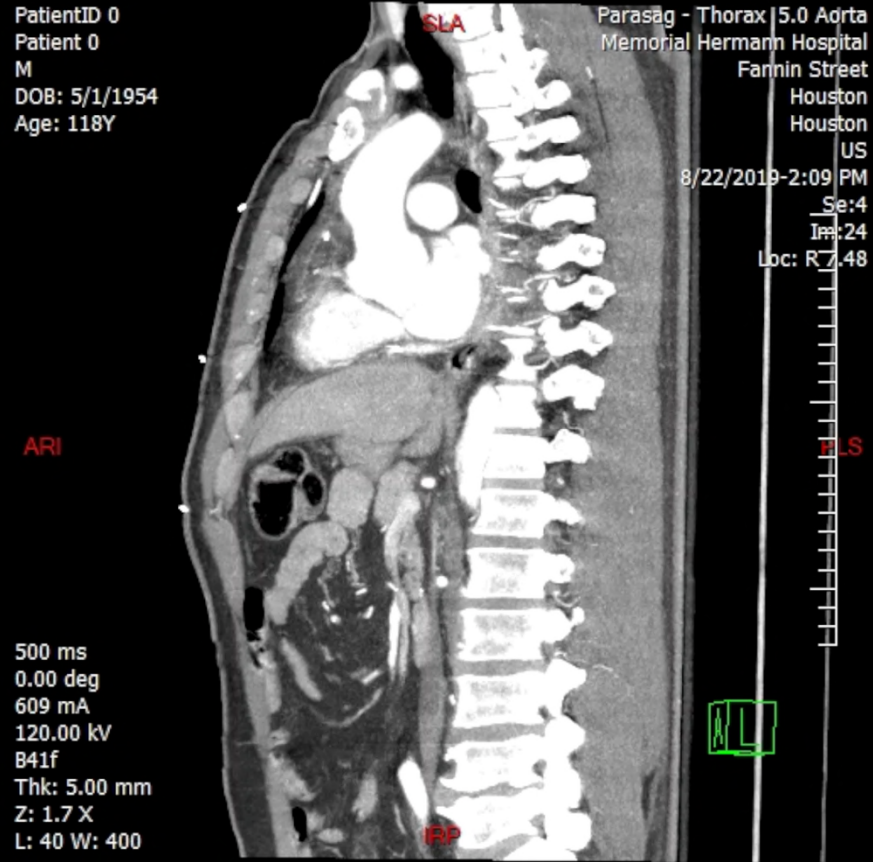


CT Abdomen - Axial



Axial view of the abdomen in arterial phase.
Focal areas of hyperdensity within the splenic parenchyma.
Area of relative hypoattenuation surrounding the spleen.

CT Thorax - Sagittal



Sagittal view of the chest in arterial phase.
Focal areas of hyperdensity within the splenic parenchyma.
Area of relative hypoattenuation surrounding the spleen.

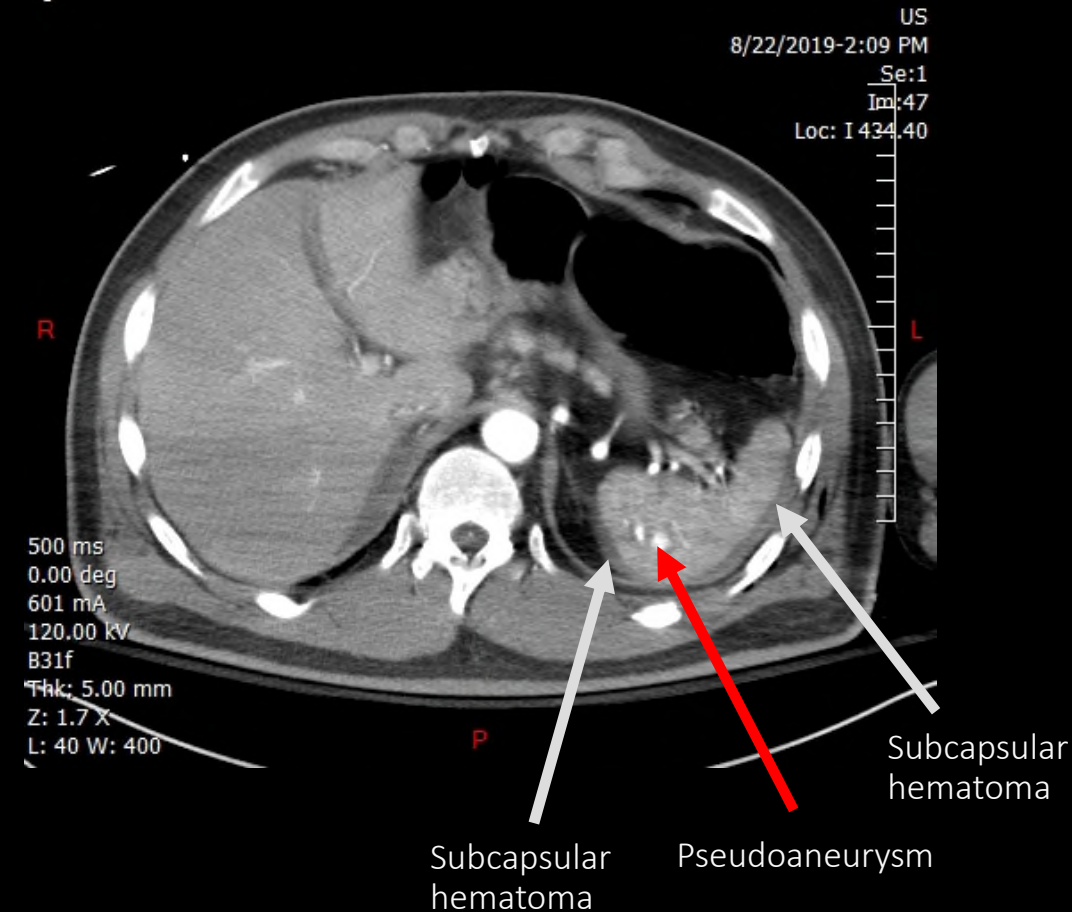
CT Thorax – Coronal



Coronal view of the chest in arterial phase.
Focal areas of hyperdensity within the splenic parenchyma.
Area of relative hypoattenuation surrounding the spleen.

Key Imaging Findings

- Grade 3 splenic injury with a subcapsular hematoma, no active extravasation
 - >50% surface area
- Multiple splenic pseudoaneurysms
- Supportive history
 - MVA, collision into driver's side (left side of patient) with 12-inch intrusion
 - Left-sided chest pain



Differential Diagnosis

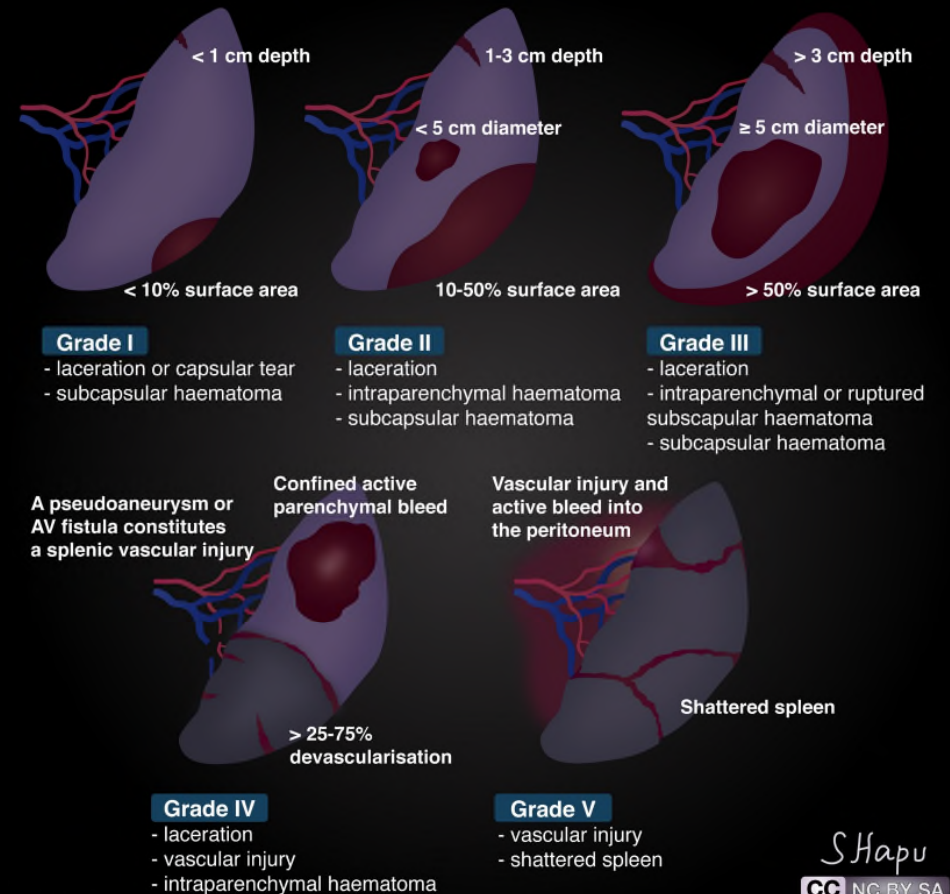
- Splenic laceration
- Subcapsular hematoma
- Splenic pseudoaneurysms
- True splenic aneurysms
- Splenic rupture
- Splenic calcifications



Delayed phase of CT abdomen distinguishing splenic pseudoaneurysm from true aneurysm.

Discussion: Splenic Injury

- Most frequently injured internal organ in blunt trauma
 - Up to 49% of abdominal organ injuries
- American Association for the Surgery of Trauma (AAST) splenic injury scale
 - Advance one grade for each additional injury up to grade III



*Advance one grade for each additional injury upto grade III.

Discussion: Splenic Pseudoaneurysm

- Rare - fewer than 200 documented cases of splenic artery pseudoaneurysms reported
- Exact mechanism unknown
 - Possible development from splenic parenchymal lacerations and hematomas that are supplied by injured splenic arteries
 - Damage to the intima and elastic lamina of the splenic artery from rapid deceleration
- Other causes
 - Pancreatic disease (most common)
 - Iatrogenic
 - Peptic ulcer disease



Discussion: Splenic Pseudoaneurysm

- Complications
 - Delayed rupture of the spleen
- Further workup
 - Doppler scan
 - confirm the neck of the pseudoaneurysm
 - Angiography
 - Most reliable study
 - Allows for transcatheter embolization



Final Diagnosis

Grade 3 splenic injury with subcapsular
hematoma and pseudoaneurysms

Treatment Options

- Conservative management/observation
 - Possible complication: spontaneous thrombosis
- Splenectomy
 - Most reliable option, lowest failure rate
 - Ideal in hemodynamically unstable patients
- This patient: Emergent arterioembolization by interventional radiology
 - Abdominal angiography, pelvic angiography, splenic arterial embolization, proximal LLE angiography
 - Transcatheter embolization performed in 37% of cases, failure rate of 14%
 - No complications in this case.

Clinical Course

- Length of stay = 10 days
- Sustained multiple injuries: left vertebral artery injury, multiple rib fractures with subcutaneous emphysema, left pneumothorax, left hemothorax, bilateral pubic ring fractures,
- Admitted to Shock Trauma Intensive Care Unit (STICU)
- Followed closely by Cardiology and Cardiovascular surgery for severe aortic insufficiency
- Day 10: bradycardic cardiac arrest; patient expired despite resuscitation efforts

Take Home Points

- In the setting of blunt abdominal trauma, look for signs of splenic injury: focal areas of hyperdensity and/or lacerations (linear streak(s) of hypodensity) within the spleen, or relative hypodensity surrounding the spleen.
- Although rare, splenic pseudoaneurysms should remain on the differential diagnosis.
- Consider early interventions, such as a splenectomy or embolization.

References

- Dror, S., Dani, B. Z., Ur, M., & Yoram, K. (2002). Spontaneous thrombosis of a splenic pseudoaneurysm after blunt abdominal trauma. *Journal of Trauma and Acute Care Surgery*, 53(2), 383-385.
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Questions?