

Imaging in Level I Traumas for Pneumothorax

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RAD 4001

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Clinical History

- Patient is a 36-year-old male who presented as a level 1 trauma with GSW primarily to L chest with small ballistic injuries to all extremities bilaterally
- + SOB
- GCS 15
- FAST negative

Pertinent Physical Exam

- CV: RRR no murmurs, rubs, gallops
- Pulm: symmetric chest rise and fall
- Skin: ballistic injuries to left thigh and chest with smaller injuries on extremities
- Vascular: palpable distal pulses in all extremities

Vitals

- Temp: 97.7F
- HR: 93 bpm
- RR: 17 breaths/min
- BP 143/85
- SPO2: 98%

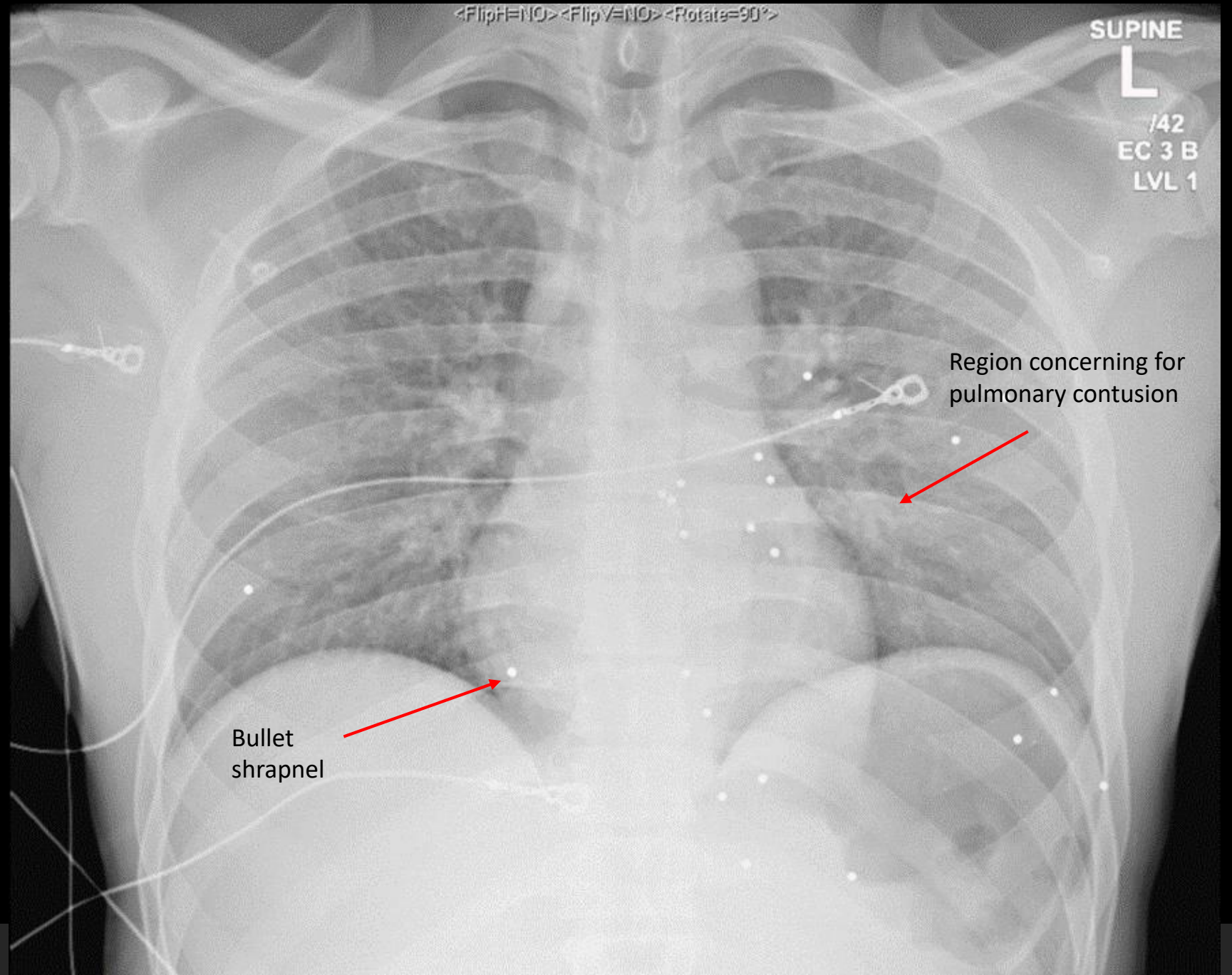
Labs

- CO2 Level: 23(L)
- Lactic Acid: 4.2(H)
- V PH: 7.53
- V PCO2: 24 (L)
- V HCO3 21 (L)
- Hgb: 12.3

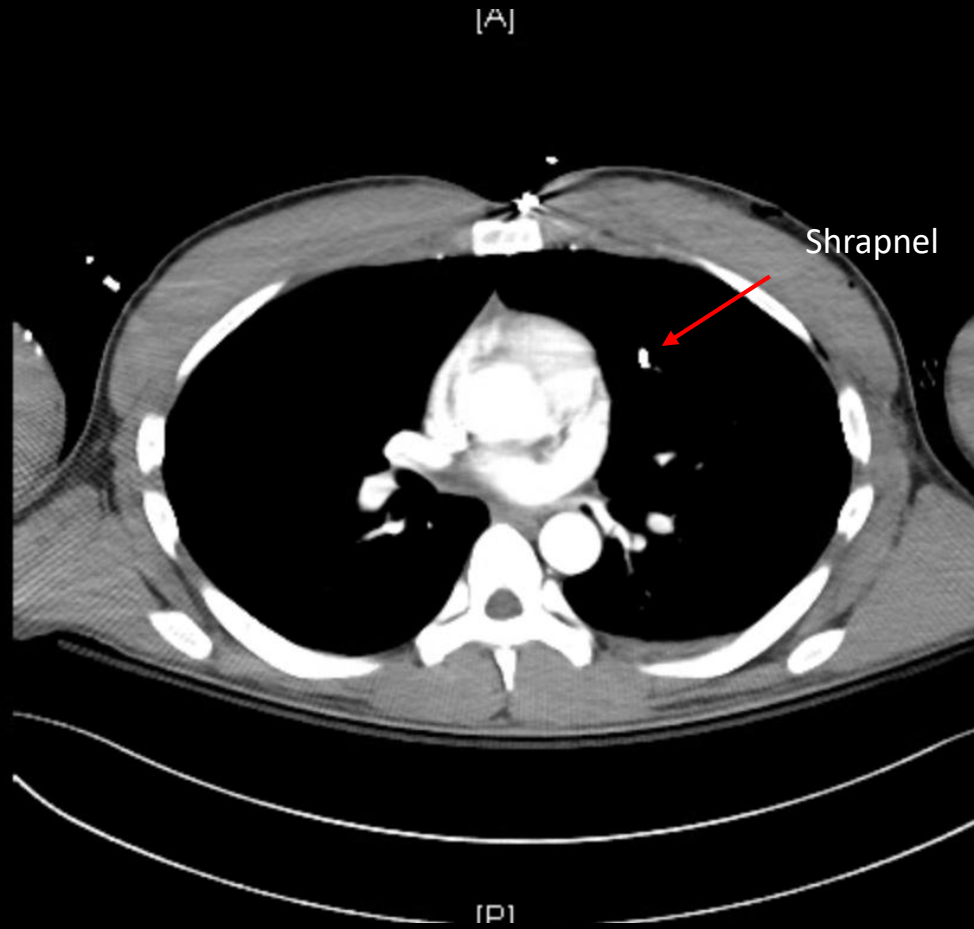
Differential Diagnosis Prior to Imaging

- Pneumothorax/hemothorax
- Possible cardiac effusion with proximity of bullets to cardiac structures
- Pulmonary contusion

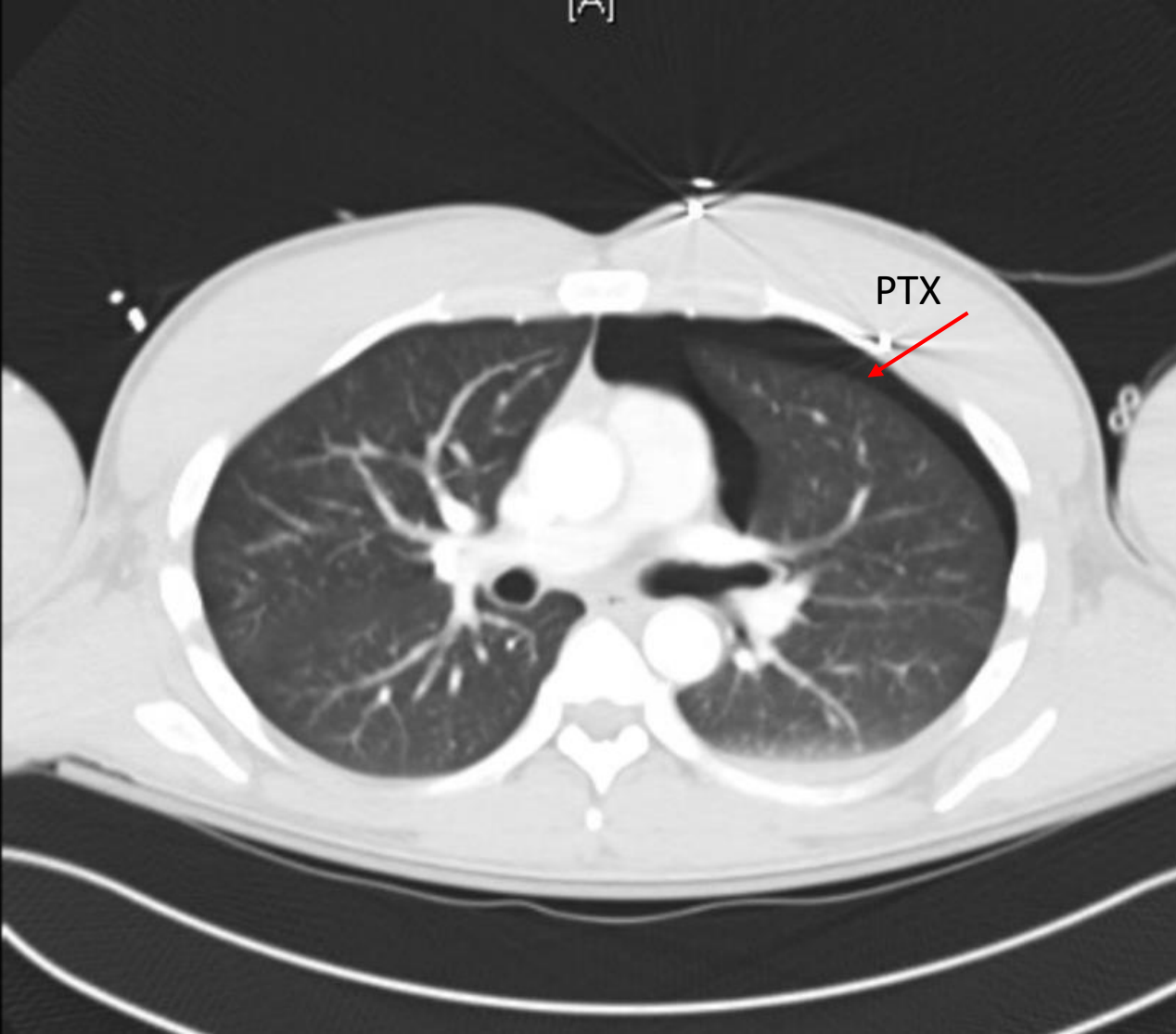
CXR (10/8)



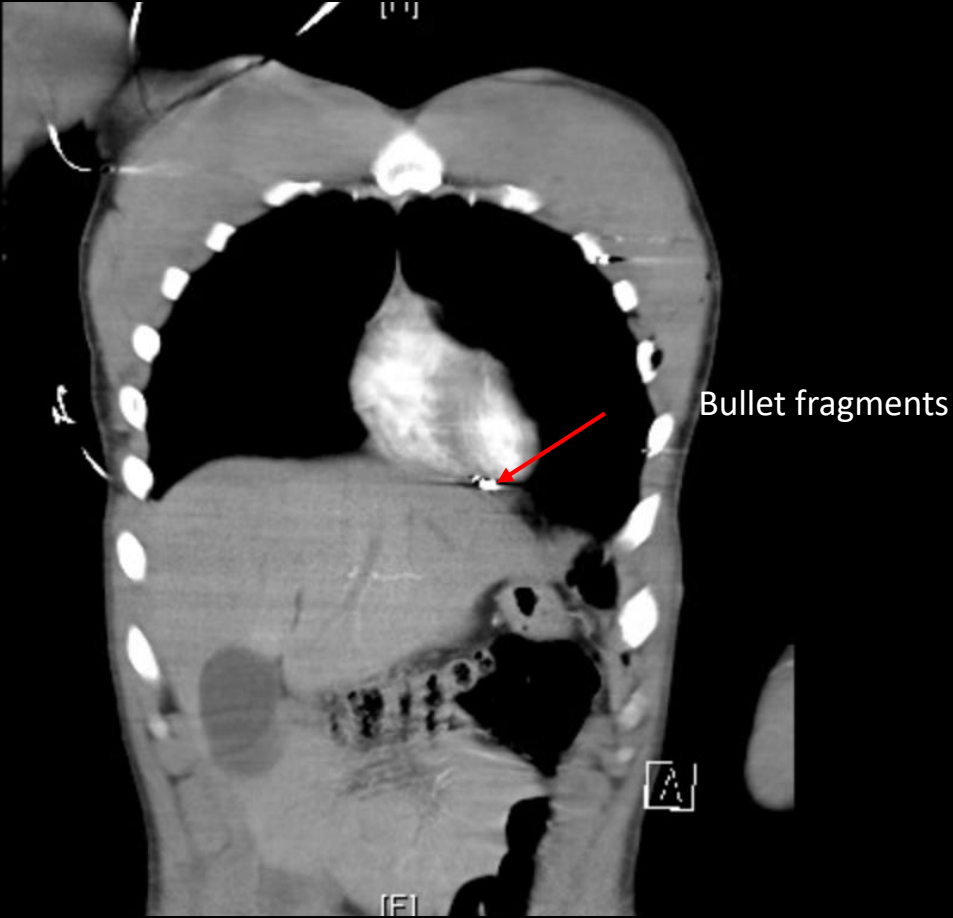
Trauma Chest CT w/ contrast 10/8



Trauma Chest CT w/ contrast 10/8



Trauma Chest CT w/ contrast 10/8



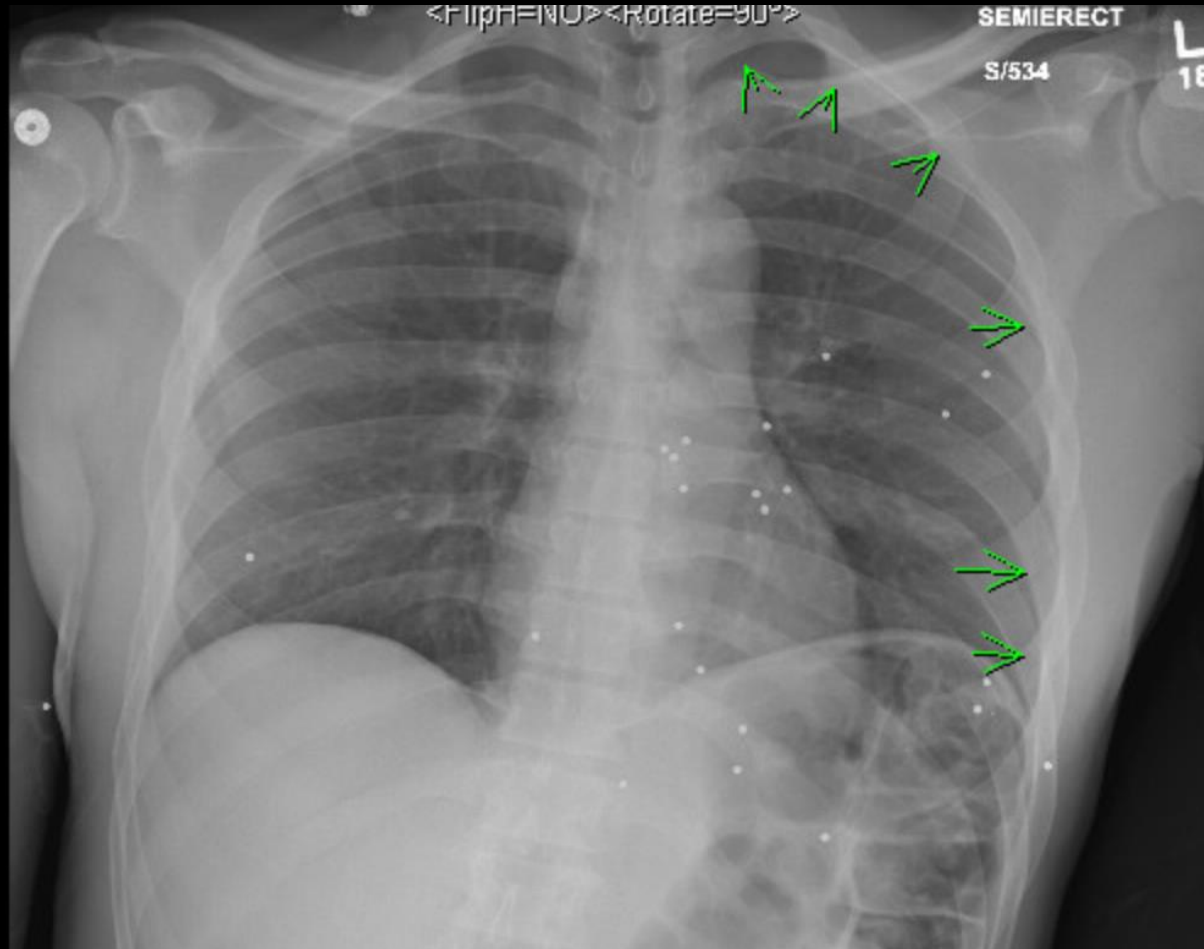
Echo (10/8)

- LV normal in size and wall thickness
- Estimated EF of 60-65% with no wall motion abnormalities
- RV normal in size and function
- Normal atria and valves
- **No pericardial effusion**

Differential Diagnosis based on Imaging

- Based on patient history, there was concern for a pericardial effusion
 - This was not seen on CT or echo
- Initial differential included PTX, not well visualized on CXR but was seen on CT
- Pulmonary contusion was considered in this patient and small contusion was possibly seen on CXR

F/U CXR 10/9

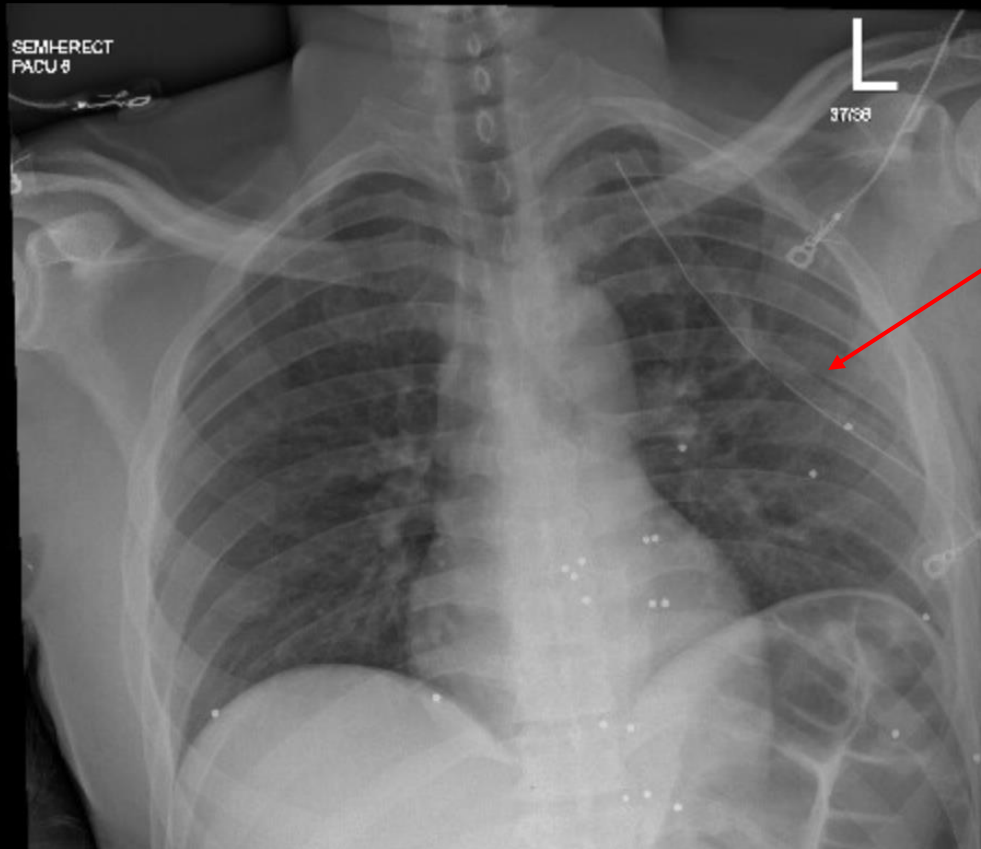


Increase in L PTX
size

Treatment

- Left chest tube thoracostomy
- Left anterior thigh fasciotomy after swelling and numbness of left thigh developed on hospital day 1

CXR 10/9 s/p L chest tube



L chest tube

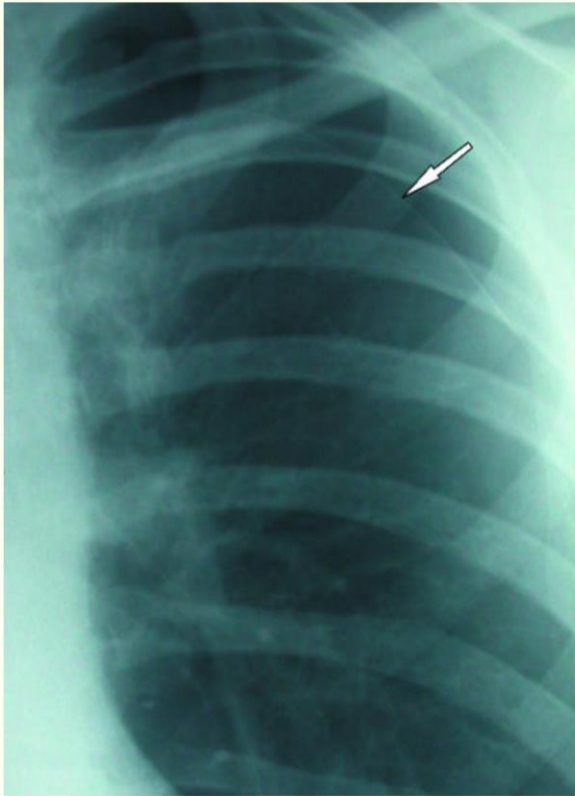
Final Diagnosis

- Left pneumothorax
 - Initially not well visualized on CXR
 - Better seen following day as PTX expanded
 - Patient treated with chest tube with placement visualized on follow-up CXR

Discussion

- PTX occurs when air accumulates between visceral and parietal pleura of lung and can be traumatic or atraumatic and may be classified as simple, tension, or open
- Visible pleural line seen on CXR
- Lung markings absent in PTX
- Be aware that skin folds and the scapula may mimic the appearance of a PTX

PTX on CXR



[Fig 1](#)

(left) Classic appearances of left sided pneumothorax with readily apparent visceral pleural line (arrow)

O'Connor AR, Morgan WE. Radiological review of pneumothorax. *BMJ*. 2005;330(7506):1493-1497. doi:10.1136/bmj.330.7506.1493

ACR appropriateness Criteria

Variant 1: Suspected cardiac injury following blunt trauma, hemodynamically stable patient.		
Procedure	Appropriateness Category	Relative Radiation Level
US echocardiography transthoracic resting	Usually Appropriate	○
Radiography chest	Usually Appropriate	☢
CT chest with IV contrast	Usually Appropriate	☢☢☢
CT chest without and with IV contrast	Usually Appropriate	☢☢☢
CTA chest with IV contrast	Usually Appropriate	☢☢☢
CTA chest without and with IV contrast	Usually Appropriate	☢☢☢

- Based on GSW with concern for pericardial effusion v. tamponade v. PTX the imaging was appropriate by the ACR

Cost of Imaging using MHH Chargemaster

- <https://www.memorialhermann.org/patients-caregivers/memorial-hermann-charge-master/>
- Chest X-ray \$670
 - Has received 9
- Chest CT w/ Contrast \$3936.25
- Humerus 2 view \$797
- Forearm bilateral \$1123
- Femur Unilateral \$651

Take Home Points / Teaching points

- A PTX may not initially be seen on CXR
- Confirm with CT scan
- Repeat imaging as needed based on clinical picture

References

Ganie FA, Lone H, Lone GN, et al. Lung Contusion: A Clinico-Pathological Entity with Unpredictable Clinical Course. Bull Emerg Trauma. 2013;1(1):7-16.

McKnight CL, Burns B. Pneumothorax. [Updated 2020 Aug 11]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441885/>

O'Connor AR, Morgan WE. Radiological review of pneumothorax. BMJ. 2005;330(7506):1493-1497. doi:10.1136/bmj.330.7506.1493



Questions?