Tension Pneumopericardium: A Case Highlighting the Importance of Early Detection in the Setting of Blunt Polytrauma

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INTRODUCTION:

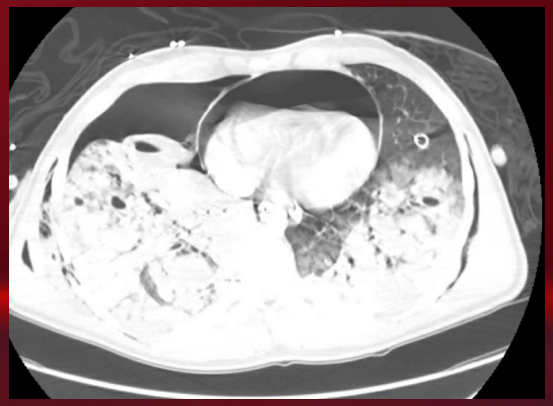
- Recognizing pneumopericardium early on is crucial to resuscitation and survival.
- Etiology of pneumopericardium is linked to many causes: neonates receiving positive pressure ventilation, gas-producing infection, penetrating chest trauma; less likely blunt trauma

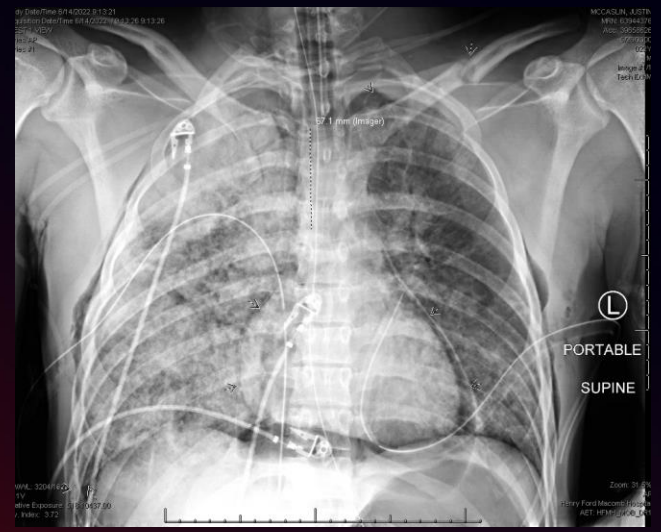
CASE DESCRIPTION:

- A 22 year-old male Motorcyclist presented to the hospital after a colliding with a car at approximately 50 mph
- GCS 8. HR 120, BP 80/40, with diminished breath sounds. The patient was intubated and chest tubes placed, with 700cc sanguineous output in fifteen minutes on the right side.
- FAST exam performed throughout the evaluation, no pericardial effusion. The pneumopericardium on CXR, was initially attributed to pneumomediastinum. While obtaining CT imaging, obvious pneumopericardium was identified.
- Pulses were lost prior to pericardiocentesis. Resuscitative thoracotomy performed with decompression of tense pericardial sac. An immediate gush of air released upon incising the sac. The patient had ROSC after two rounds of CPR.
- Taken immediately to Operating Room for further exploration and repair. While in the operating room bronchoscopy was also performed, no tracheobronchial injuries were identified.

DISCUSSION:

- Pneumopericardium secondary to blunt trauma is rare, in the few documented cases, it was seen more after polytrauma.
- Etiology of pneumopericardium is linked to three scenarios
  - Direct communication between pleural and pericardial cavity after deceleration injury triggers damage to alveoli leading air to escape into pleural space, and tunnel into pericardium.
  - Macklin effect theorizes that pulmonary tears are caused by increased pressure in alveoli leading to air escaping along pericapillary interstitial space, leading to air escaping into pericardium along the weak points of the pericardium.
  - Direct communication between pericardial sac and bronchial tree via tracheobronchial or esophageal injury.
- The pneumopericardium in this patient's case likely resulted from the Macklin Effect, as his tamponade physiology did not improve with chest tube placement, and it worsened with mechanical intubation. There were no tracheobronchial injuries identified on bronchoscopy.





CONCLUSION:

- Tension pneumopericardium is exceptionally rare in the setting of blunt trauma; trauma surgeons should be able to identify pneumopericardium based on physiology and radiology findings.
- Mechanical ventilation worsens pneumopericardium due to barotrauma.
- Trauma physicians should have tension pneumopericardium in their differential diagnosis when there is tamponade physiology without visualized pericardial effusion on FAST exam, especially if the condition worsens with intubation.

REFERENCES AVAILABLE UPON REQUEST