CIRA Case of the Week

Case Courtesy of Dr. Stephanie Steski

University of Manitoba

Clinical History

- Previously healthy 21 year old male
- Presented with multiple penetrating stab wounds to the lower chest, upper abdomen, extremities, and neck

Physical Exam

- Alert and oriented, GCS 15
- 2 stab wounds to the right anterior chest, additional stab wounds to both forearms and posterior neck
- Cardiovascular exam – normal
- Respiratory exam – decreased air entry on the right
- Abdominal exam – soft, non-tender, bowel sounds present

Labs

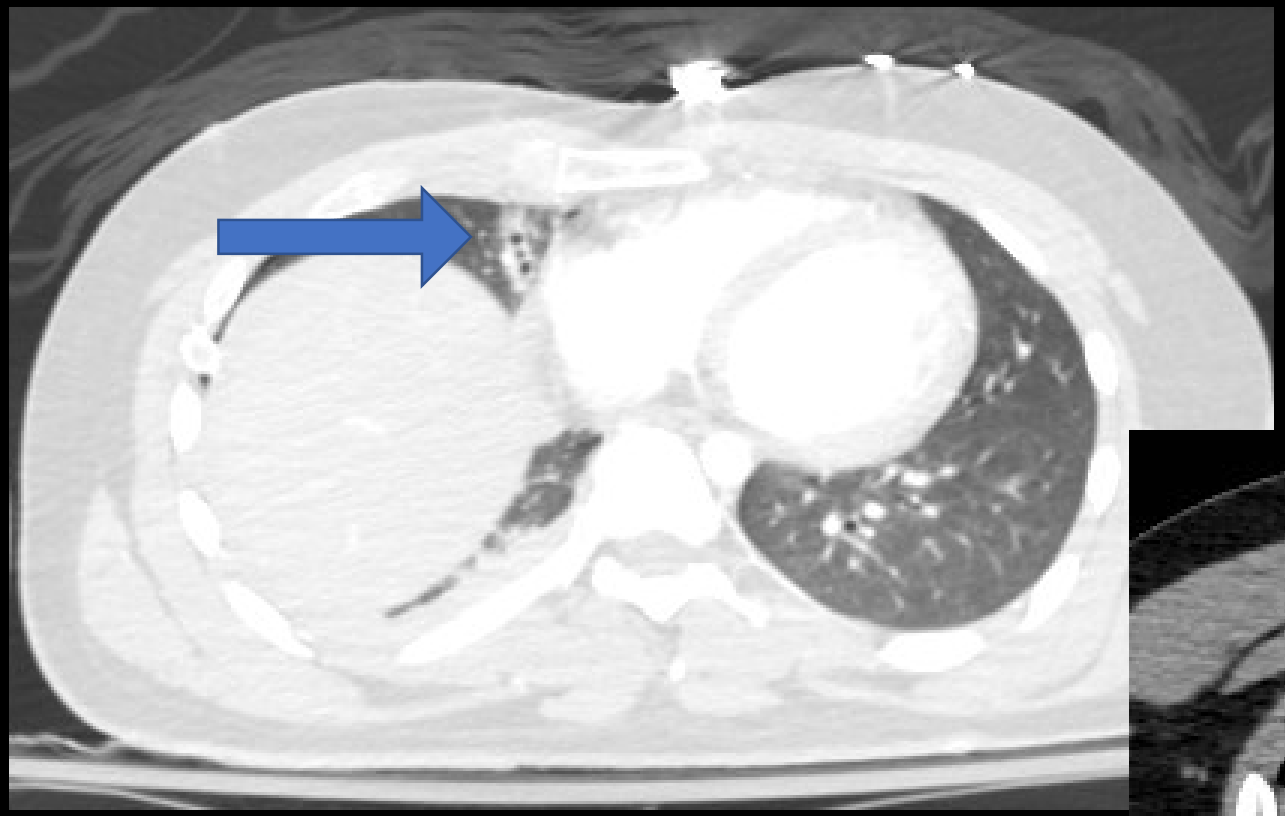
- CBC - Hgb 130, WBC 28.8, Plt 308
- Electrolytes - Normal, except for an elevated anion gap of 26
- CK 341
- Elevated LFT’s - AST 45, ALT 41, LD 293, GGT 23, ALP 65
- Bilirubin - Total < 3, Direct < 2
- Elevated EtOH 57.8

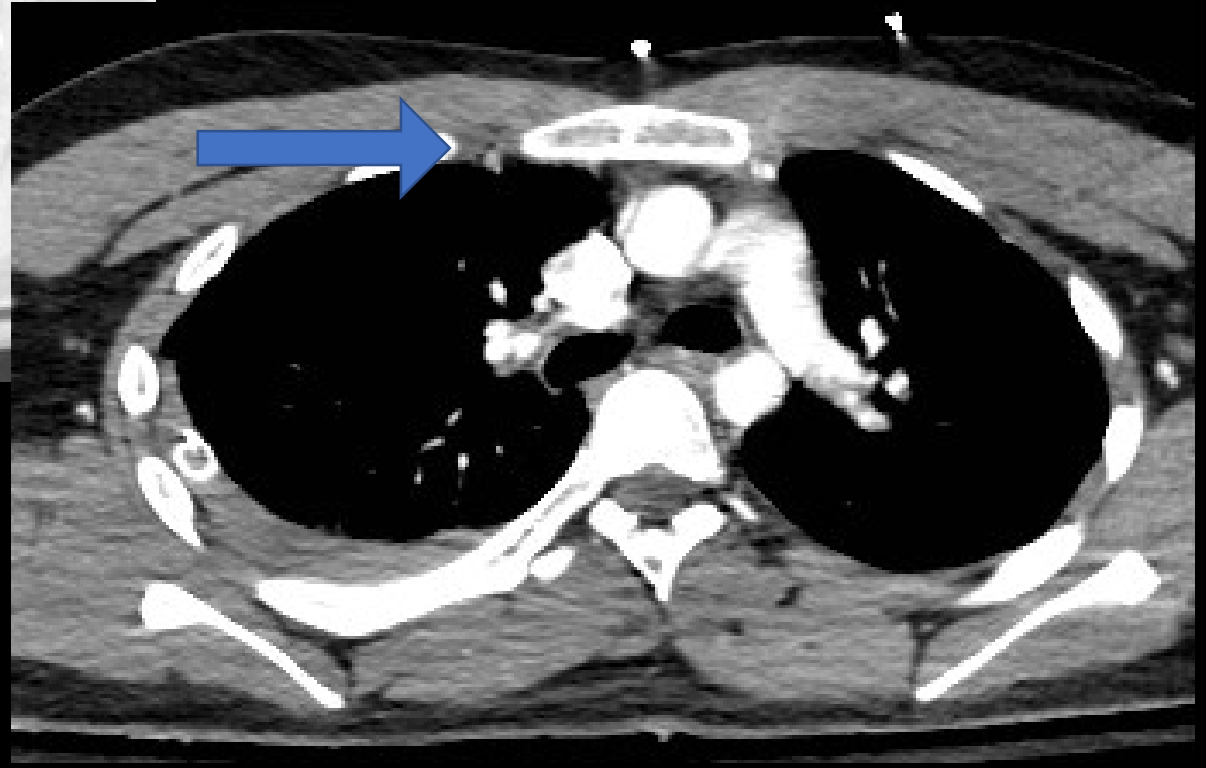
Imaging

- Non-contrast enhanced CT of the brain and cervical spine
  - Normal
- CT angiogram of the carotid arteries
  - Small superficial laceration in the posterior subcutaneous tissue of the lower neck

CT Angiogram of the Chest

- Small right middle lobe pulmonic laceration
- Small right hemopneumothorax
- Right-sided chest tube
- Given the location of injury a diaphragmatic injury could not be excluded





CT Abdomen/Pelvis

- Contrast enhanced portal venous phase CT of the abdomen and pelvis was obtained
- Acute hepatic laceration through the central aspect of the right hepatic lobe
- No evidence of active contrast extravasation
- Small hemoperitoneum

Discharged

- The patient recovered well and was discharged from the hospital a few days after his initial presentation

1 month following the initial trauma…

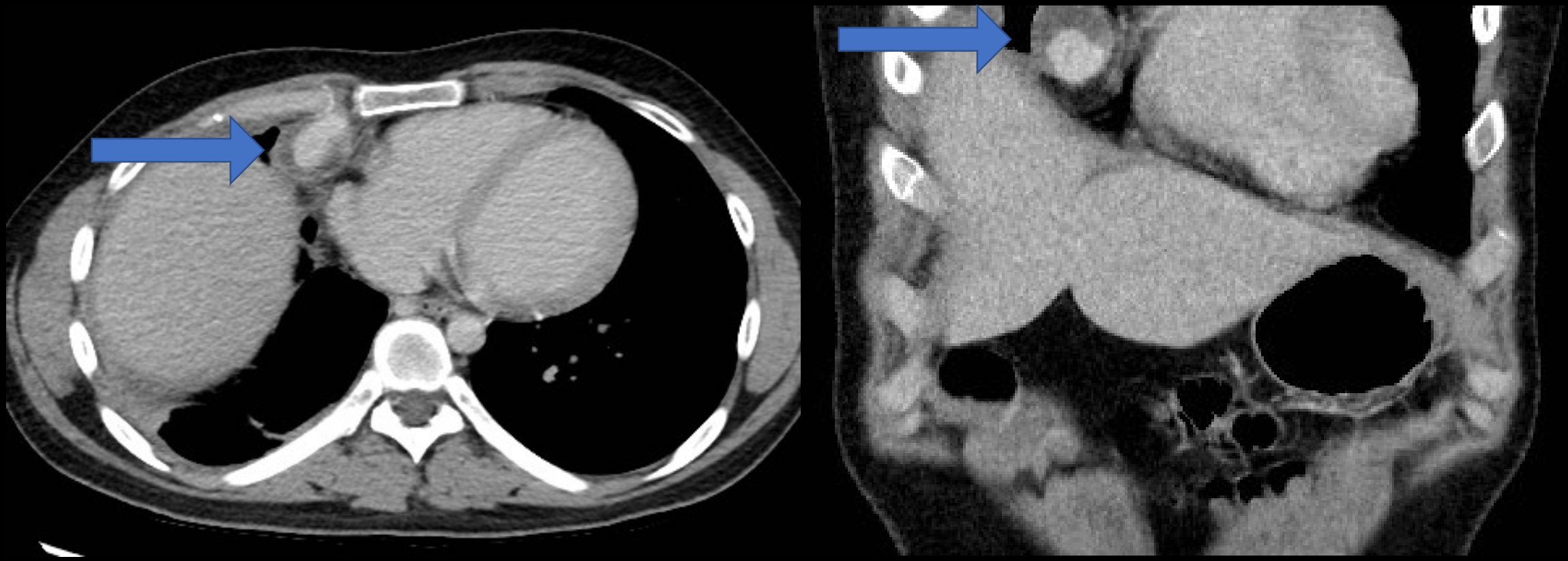
- Patient transferred from rural hospital for severe epigastric pain
- Vital signs normal
- Physical exam
  - Epigastric tenderness

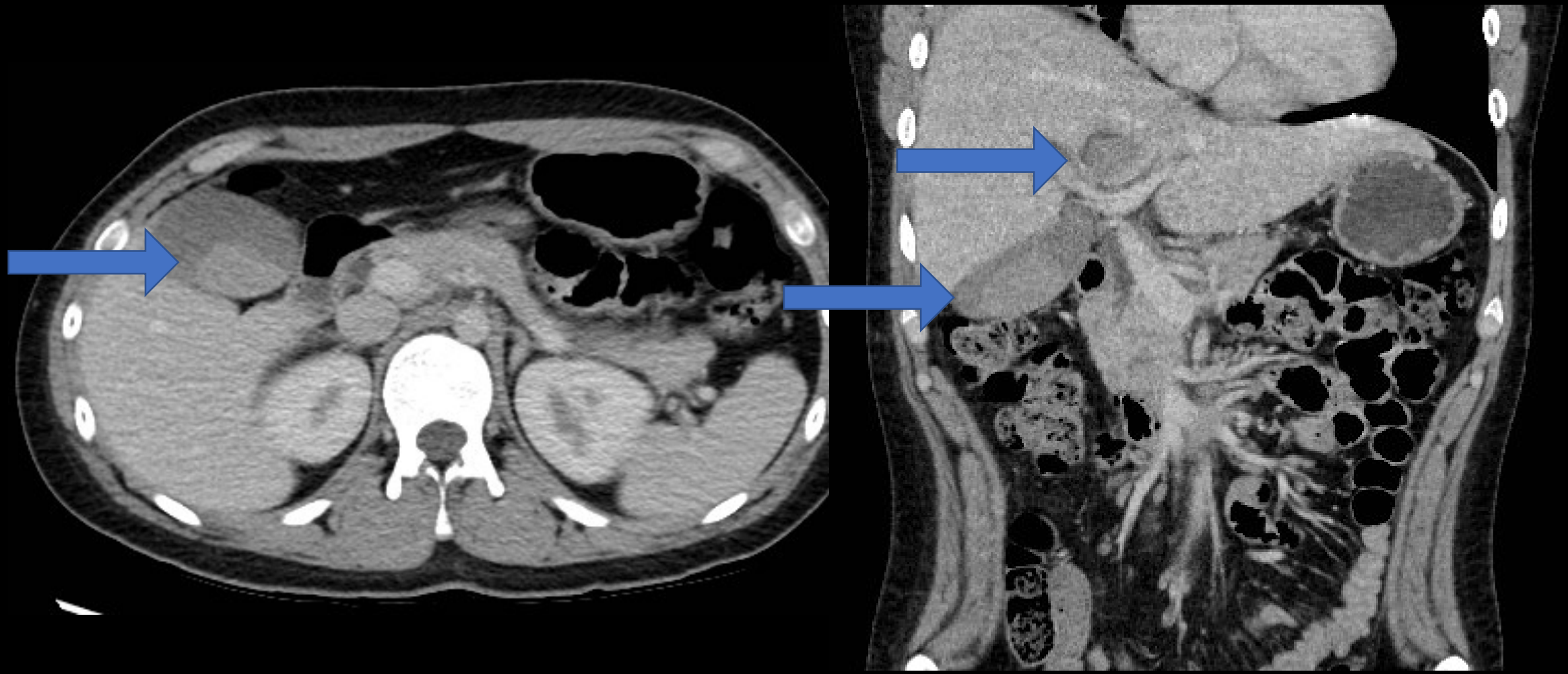
Lab Values

- CBC - Hgb 103 (Hgb 130 one month prior), WBC 6.9, Plt 341
- LFT’s - normal
- Bilirubin - total 19, direct 9

Imaging

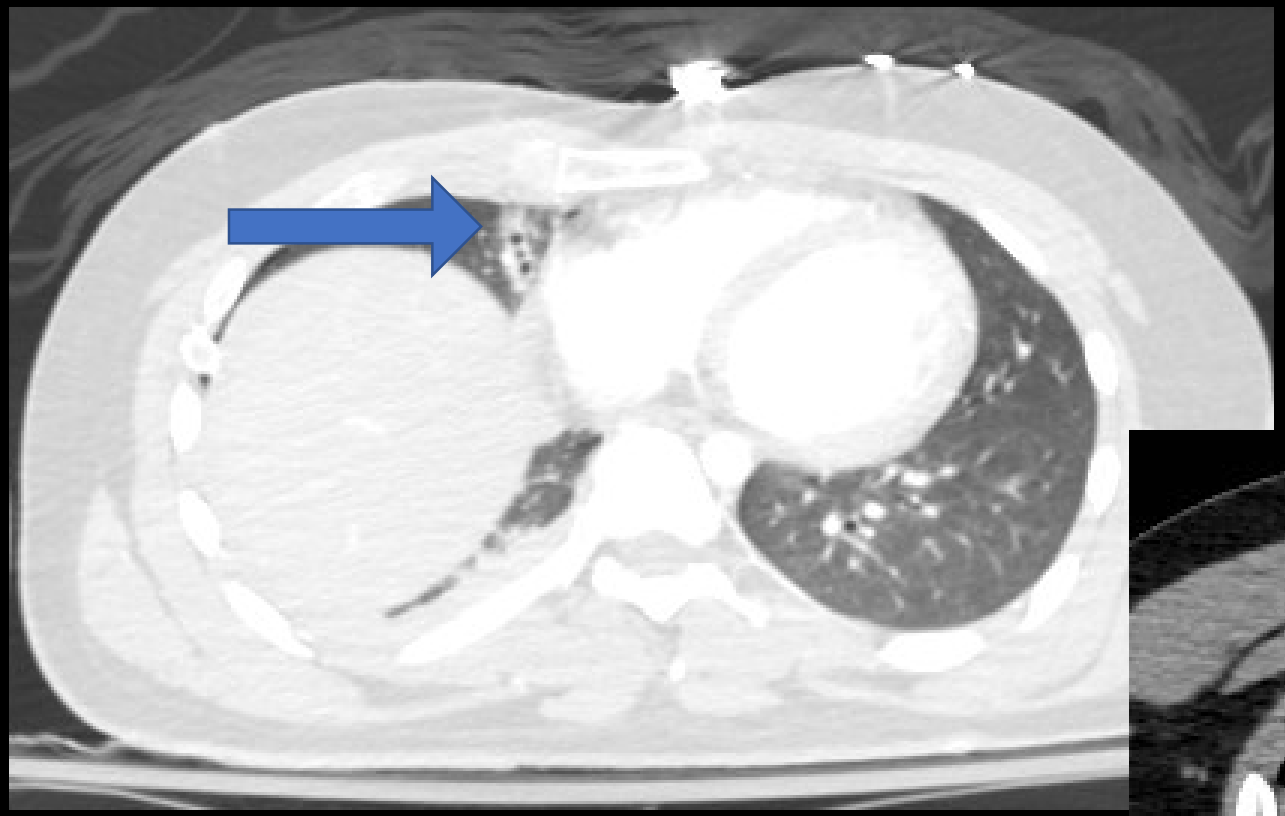
- Contrast enhanced CT of the abdomen and pelvis in portal venous phase was obtained
- Interval increase in size of biloma, with associated hematoma, centrally within the right hepatic lobe
- Blood seen within the gallbladder lumen
- Incidental large right internal mammary artery pseudoaneurysm

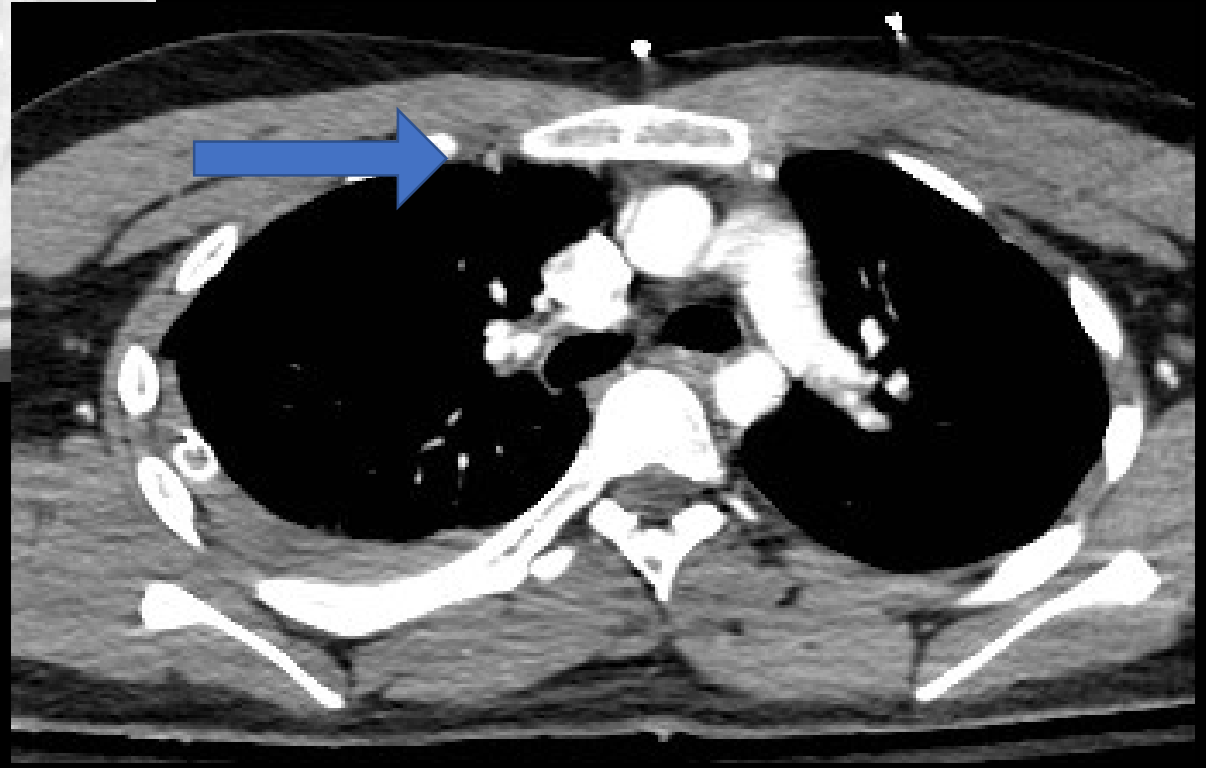




In Retrospect…

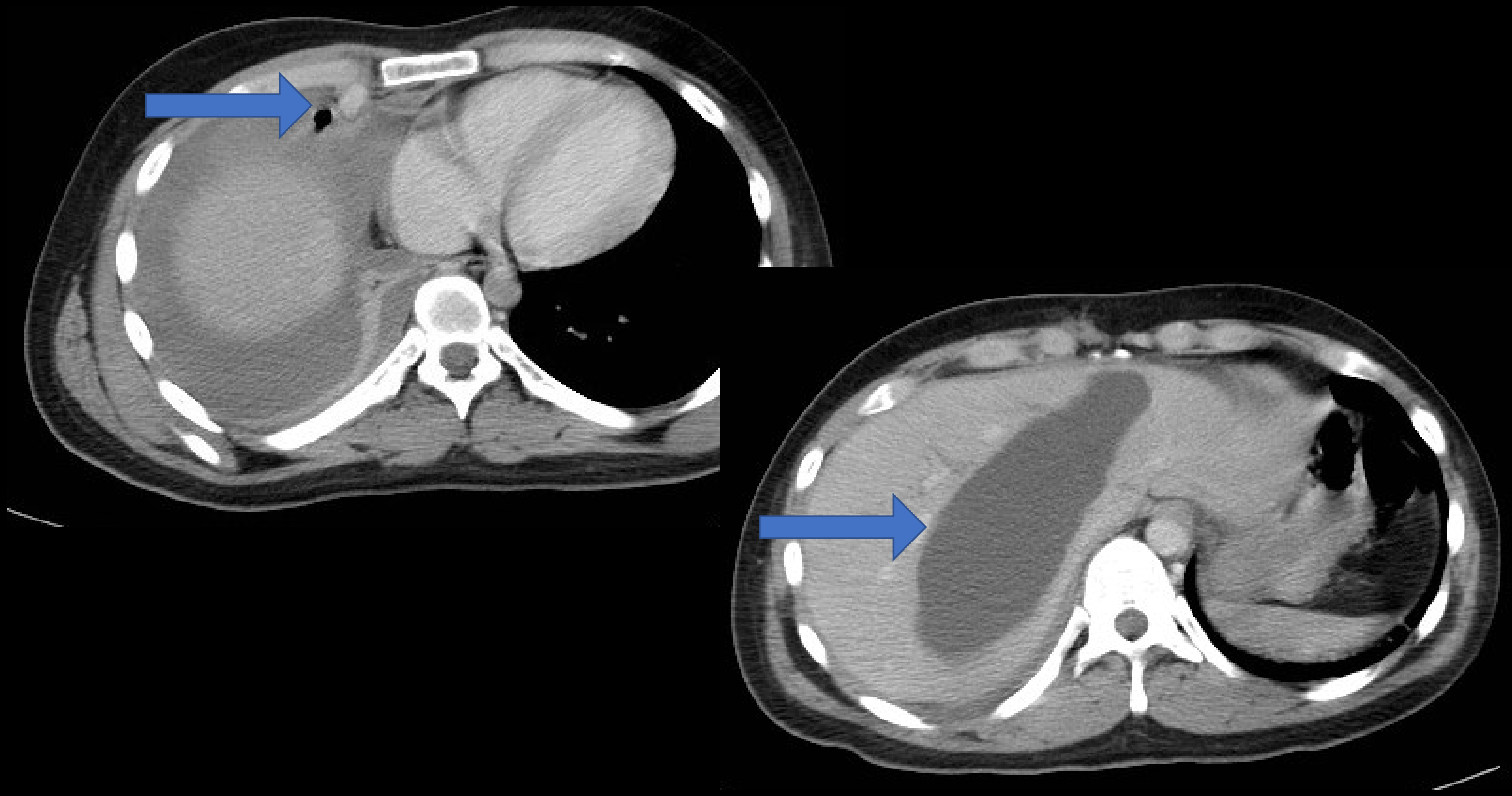
- On the initial study the penetrating stab wound traversed the region of the right internal mammary artery, although there was no evidence of active contrast extravasation or pseudoaneursym on the initial study





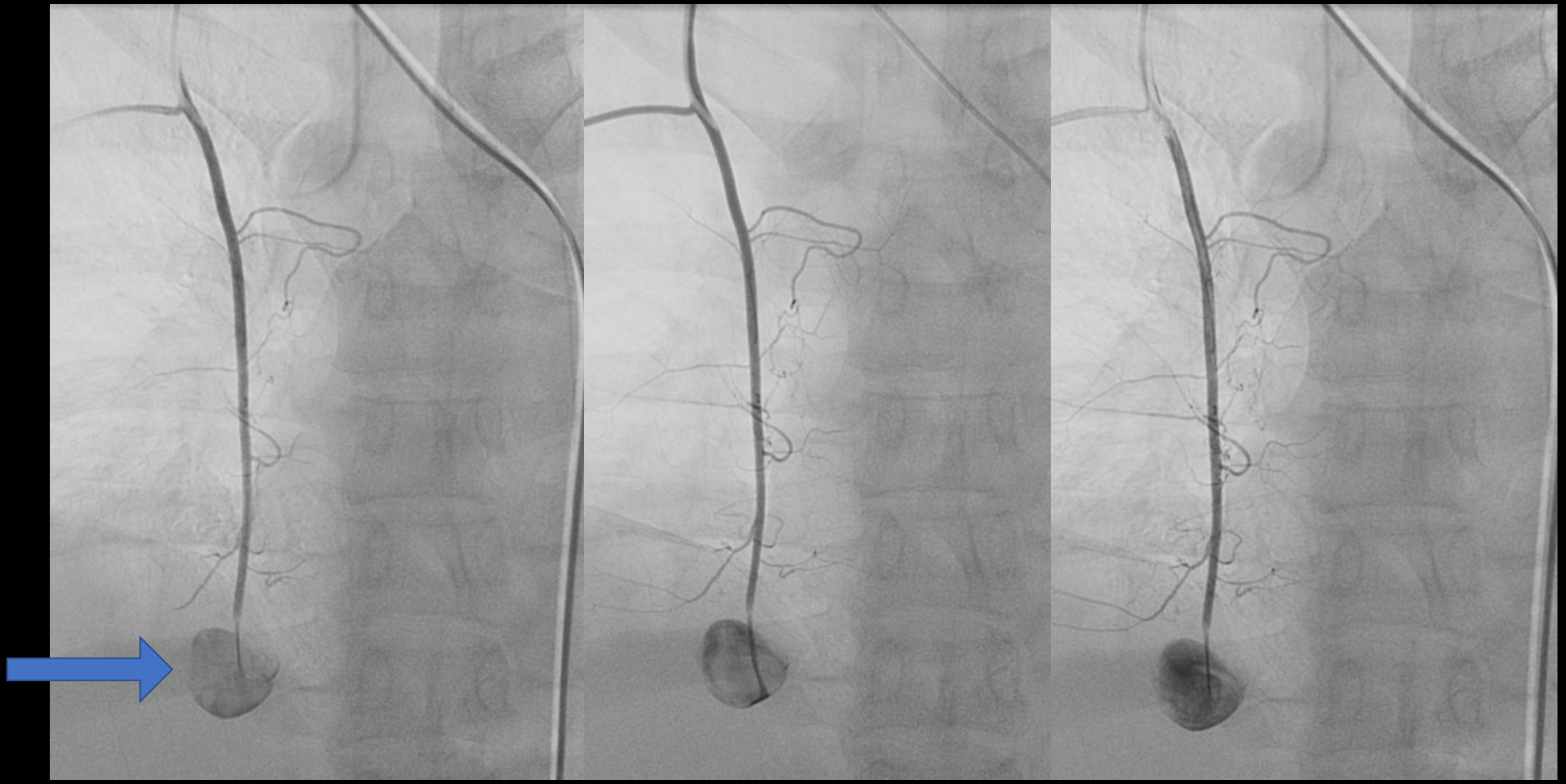
In Retrospect…

- The patient had a contrast enhanced CT of the abdomen and pelvis between the initial trauma and the CT obtained 1 month following the trauma to follow the post-traumatic biloma
- At that time the right internal mammary artery pseudoaneurysm was present although not identified.



Conventional Angiogram

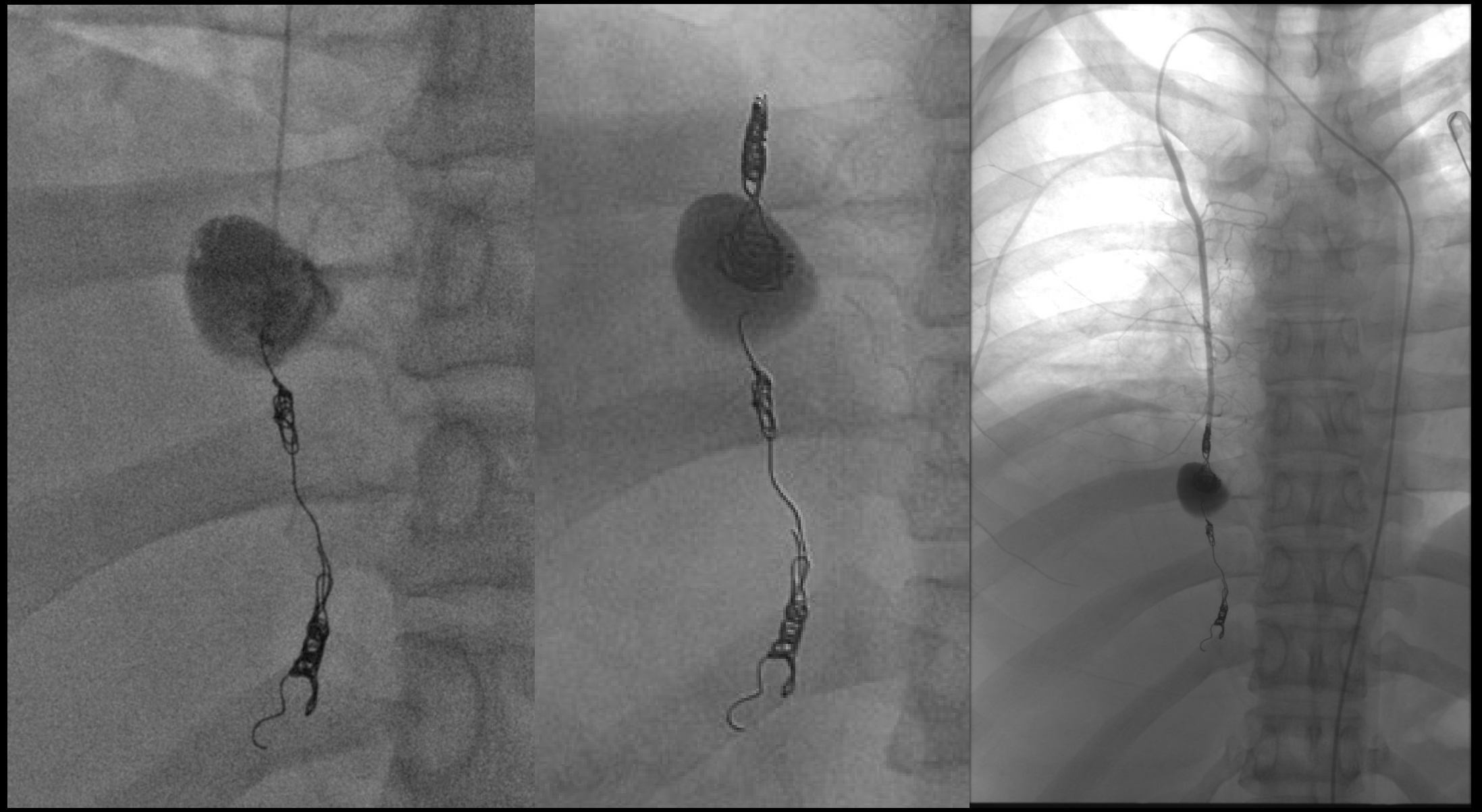
- A selective angiogram of the right internal mammary artery was performed via a right common femoral artery puncture to assess and treat the known right internal mammary artery pseudoaneurysm
- A selective angiogram of the common hepatic artery was performed given the enlarging biloma with new associated hematoma, and interval decrease in hemoglobin

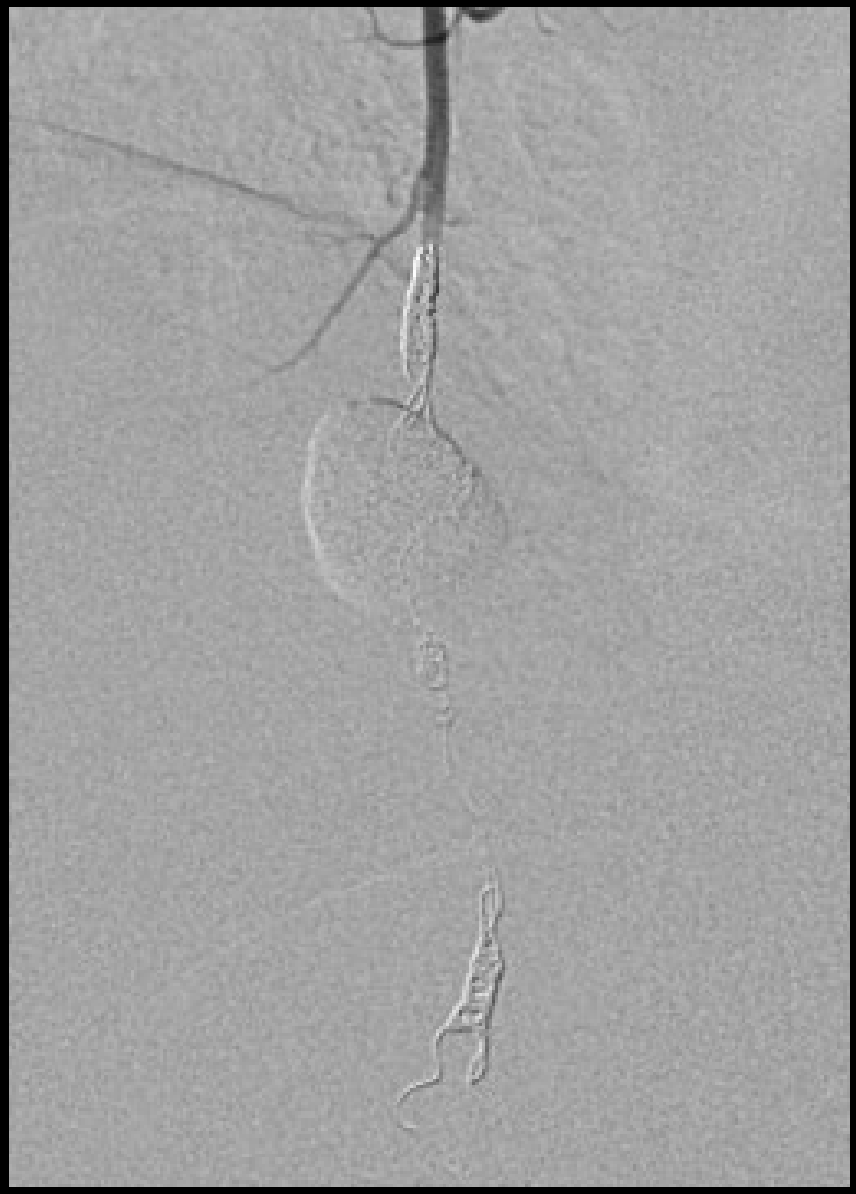


Coil Embolization

- The right internal mammary artery was embolized with multiple coils both distal and proximal to the pseudoaneurysm

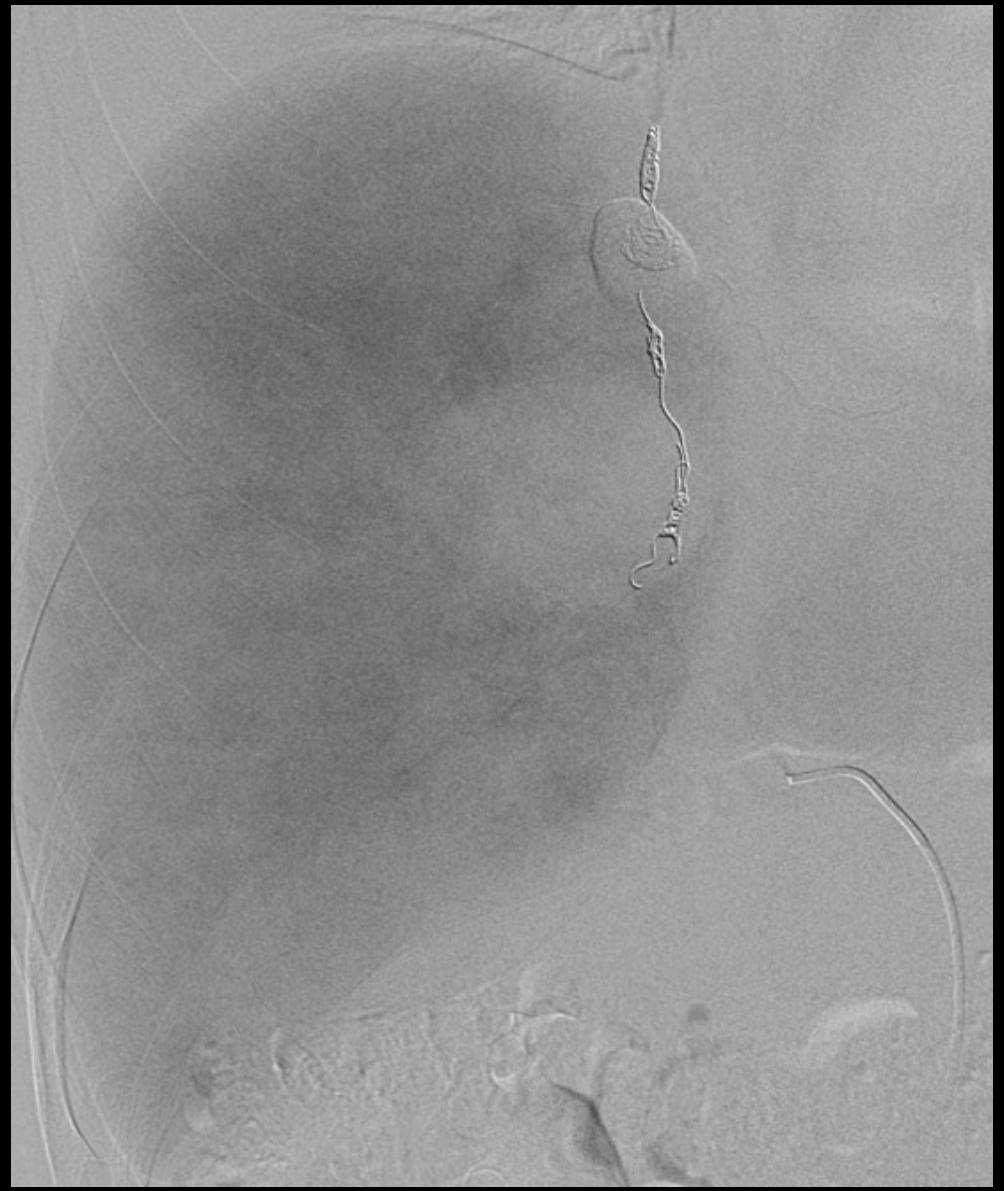
- Post-embolization angiogram demonstrated successful embolization of the pseudoaneurysm, without evidence of opacification





Common Hepatic Artery Angiogram

- Arterial phase
  - No evidence of active contrast extravasation
  - No evidence of arteriovenous malformation
- Parenchymal phase
  - Paucity of blood flow centrally within the right hepatic lobe at the site of the known biloma/hematoma

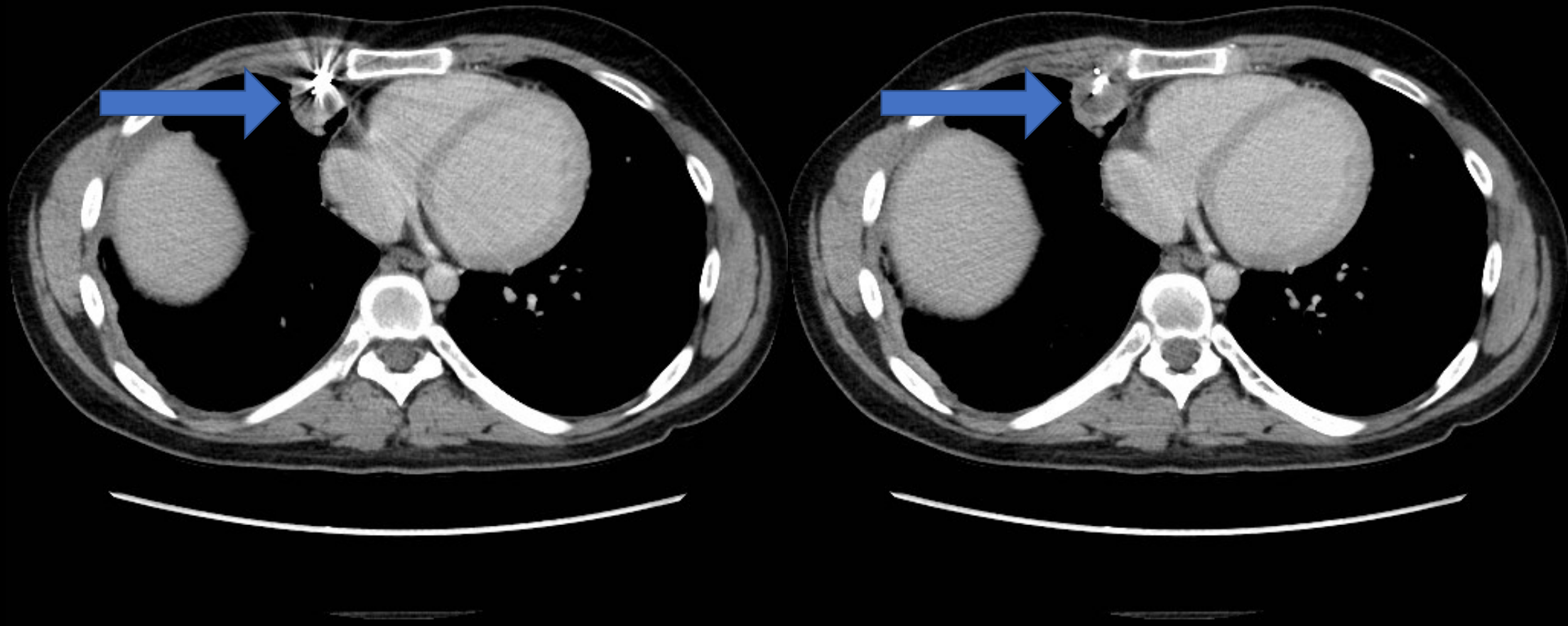


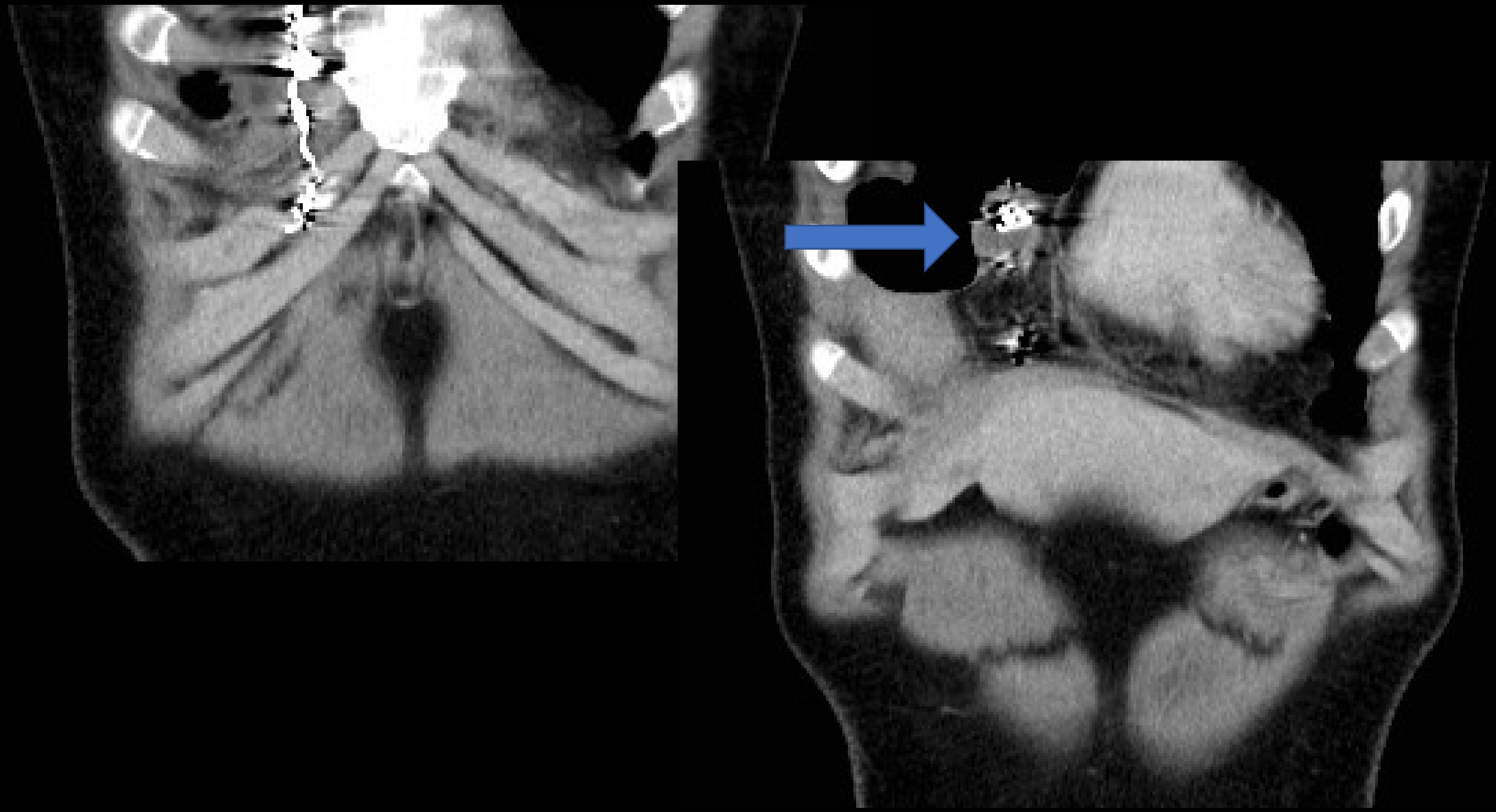
Post-Embolization

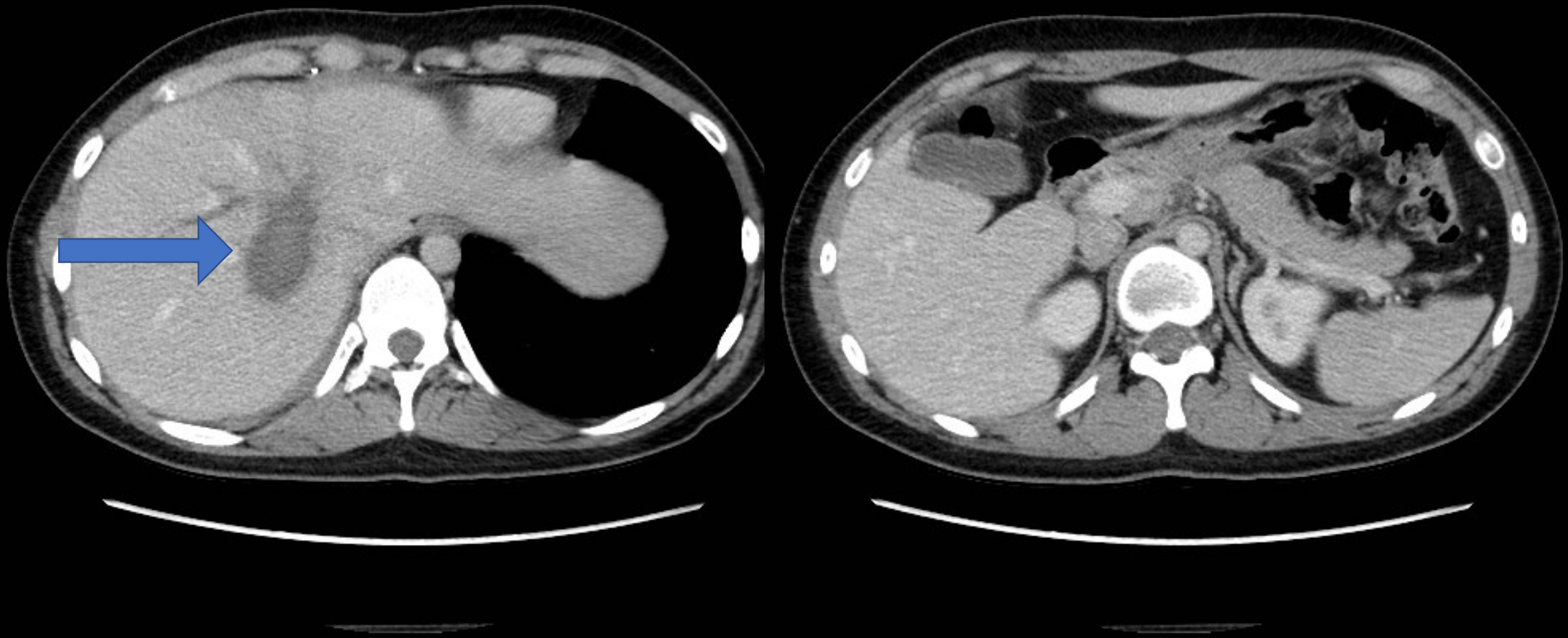
- The patient developed a small right groin hematoma, confirmed on ultrasound
- The patent was discharged a few days after the embolization

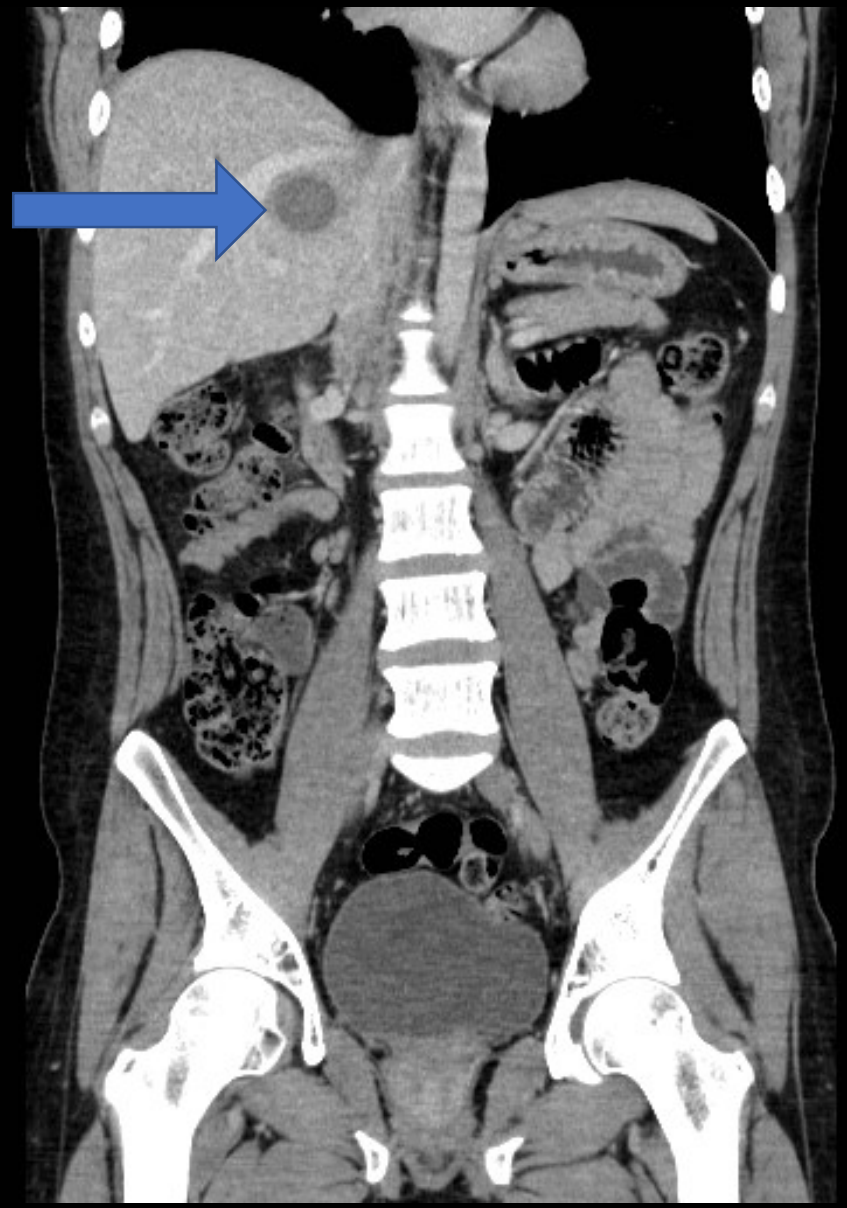
Outpatient Follow-up CT

- 1 month post coiling of the right internal mammary artery pseudoaneurym a CT of the abdomen and pelvis in portal venous phase was obtained for reassessment of the biloma
- Decreased size of the right internal mammary artery pseudoaneurysm, no evidence of contrast opacification
- Trace residual hemothorax
- Decreased size of the biloma/hematoma centrally in the right hepatic lobe at the site of previous hepatic laceration









Etiology

- Iatrogenic is the most common cause
  - Sternotomy related
  - Central venous line placement
  - Pacemaker placement
- Post-traumatic is the second-most common cause
  - Blunt trauma
  - Penetrating trauma

Sternotomy-Related …

- 11 reported cases
  - Coil embolization - 7 patients
  - Surgical ligation - 2 patients
  - Covered stent - 1 patient
  - Conservative management with follow-up - 1 patient

Iatrogenic …

- Pacemaker-related – 2 coil embolizations, 1 coil/PVA particle embolization, and 1 surgically ligated
- Central line placement – 1 topical bovine thrombin embolization, 4 coil embolizations, 1 surgical ligation
- Stereotactic breast biopsy – failed manual and US-guided compression, successful surgical ligation
- Sentinel lymph node biopsy – embolization
- Pericardiocentesis – coil and gelfoam embolization

Trauma

- Penetrating
  - Stab wound – 2 reported cases with coil embolization in both
  - Gun shot wound - 1 reported case with conservative management
- Blunt
  - Chen et al literature review
    - 8 patients with internal mammary artery pseudoaneurysm post blunt trauma
      - Half were surgically ligated, half were treated with endovascular embolization
  - Ma et al.
    - 4 months post MVA presented with chest pain and abnormal CXR
    - Right internal mammary artery pseudoaneurym diagnosed and surgically ligated

IMA Mycotic Pseudoaneurysms

- A few reported cases of IMA mycotic pseudoaneurysms treated with coil embolization …
  - 15 year old male with left tubercular empyema (Yadav et al.),
  - 5 year old male with S. aureus left anterior chest wall infection (Deshmukh et al.)
  - 11 year old female with right anterior chest wall abscess secondary to TB infection (Deshmukh et al.)
  - 18 year old male with invasive aspergillus fumigatus in the left anterior chest wall (Sanchez et al.)

Age of Patients…

- Embolization
  - Age range 5 – 85, Mean: 52.3, Median: 55-65
  - Males: 15, Females: 11

- Surgery
  - Age range: 15 – 84, Mean: 49.6, Median: 44
  - Males: 5, Females: 4

Why Is This Important?

- Pseudoaneurysms are at increased risk of rupture
- Rupture of the internal mammary artery is potentially fatal, due to the high flow of blood through it

Treatment Methods

- Conservative management
- Manual or US-guided compression
- Covered stent
- Embolization
- Surgical ligation

Key Points

- Internal mammary artery pseudoaneurysms are rare
- Assess internal mammary arteries in patients with trauma, prior sternotomy, central line or pacemaker placement
- There are few different treatment options, our case was successful with endovascular coil embolization

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