AMSER Case of the Month
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43-year-old male with a L3 burst fracture

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Patient Presentation

• **History of Present Illness:** 43-year-old male presented as level 1 trauma transfer after falling 30 ft off a roof and suffering blunt traumatic injuries. Initial symptoms included low back pain, left ankle pain, and right elbow injury. He denied hitting his head or passing out. Due to the nature of presentation, a trauma call was activated.

• **Past Medical History:** Bipolar disorder

• **Social History:** Former smoker

• **Medications:** No anticoagulation or pertinent medications

• **Vital signs:** BP: 104/67, HR: 77, RR: 29, SPO2: 97% on RA
Patient Presentation

• Physical Exam:
  • Constitutional: Minor distress, alert, converse, appropriate
  • Neuro: No deficits present
  • MSK:
    • Cervical Collar present, no upper motor neuron deficits present.
    • RUE: Approximate 4 cm open wound at the posterior elbow with visualization of the underlying musculotendinous structures. Pain upon passive flexion and extension 2/2 to elbow deformity. Tenderness to palpation over elbow. Sensation intact to light touch over ulnar, radial, and medial nerve distributions. Radial pulse palpable.
    • LLE: Significant swelling at ankle with obvious deformity. Sensation to light touch in the deep peroneal, superficial peroneal, and tibial distributions. Dorsalis pedis artery palpable
  • Abdomen: Soft, non-tender, non-distended
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

<table>
<thead>
<tr>
<th>Imaging Modality</th>
<th>Dose (mSv)</th>
<th>Criteria</th>
<th>Appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT thoracic and lumbar spine without IV contrast</td>
<td>1-10 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td>Radiography thoracic and lumbar spine</td>
<td>1-10 mSv</td>
<td>0.3-3 mSv [ped]</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>MRI thoracic and lumbar spine without IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
<tr>
<td>CT thoracic and lumbar spine with IV contrast</td>
<td>1-10 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
<tr>
<td>MRI thoracic and lumbar spine with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
<tr>
<td>CT myelography thoracic and lumbar spine</td>
<td>10-30 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
<tr>
<td>CT thoracic and lumbar spine without and with IV contrast</td>
<td>10-30 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually not appropriate</td>
</tr>
</tbody>
</table>

This imaging modality was ordered for initial evaluation given trauma protocol. A subsequent 2vw lumbar spine x-ray was ordered the next day.
Findings: (labeled)

Yellow Arrows: L1 and L2 endplate fracture deformities.

Green Arrow: L3 burst fracture with 25%-50% loss of height.
Final Diagnosis:
L1 and L2 endplate fractures and L3 burst fracture with facet capsule widening

Mechanism:
Sudden deacceleration with increased axial load

Treatment:
Spinal decompression and fusion with cement augmentation
Findings: Unlabeled

Intra-operative stabilization. Lateral fluoroscopic image for procedural planning.

Immediate post-operative lateral radiograph.
Findings: Labeled


Yellow Arrow: L2-L4 fusion with pedicle screw cement augmentation
Select the applicable ACR Appropriateness Criteria

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Radiation Dose</th>
<th>Stenosis</th>
<th>Appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTA chest abdomen pelvis with IV contrast</td>
<td>30-100 mSv</td>
<td>Null</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td>MRA chest abdomen pelvis with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td>MRA chest with IV contrast</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td>CTA chest with IV contrast</td>
<td>1-10 mSv</td>
<td>3-10 mSv [ped]</td>
<td>Usually appropriate</td>
</tr>
<tr>
<td>MRA chest abdomen pelvis without IV contrast</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>MRA chest without IV contrast</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>US duplex Doppler iliofemoral arteries</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>US echocardiography transesophageal</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>Aortography chest abdomen pelvis</td>
<td>10-30 mSv</td>
<td>Null</td>
<td>May be appropriate</td>
</tr>
<tr>
<td>US echocardiography transthoracic resting</td>
<td>0 mSv</td>
<td>0 mSv</td>
<td>May be appropriate</td>
</tr>
</tbody>
</table>

Ordered by vascular surgery for outpatient follow-up given possible aortic injury found on initial trauma CT chest/abdomen/pelvis.
Findings: Unlabeled
Findings: Labeled

Green Arrows: Hyperdense material within the subsegmental branches of the right upper lobe.
Final Diagnosis

Pulmonary Cement Embolism
Case: PCE

• Epidemiology: Pulmonary Cement Embolism (PCE)
  • Pedicle screw PMMA augmentation
    • Cement leakage into the inferior vena cava or azygos vein with subsequent migration through the pulmonary arteries into the lungs
    • Symptomatic from 1.2% to 1.4%
    • Asymptomatic from 4.2% to 16.3%

• Pathophysiology:
  • Leakages are thought to occur secondary to high pressure during percutaneous vertebroplasty
  • Overflow of bone cement during pedicle placement
  • Highly dependent on the viscosity of the Cement at time of delivery. Rapid injection of low viscous cement is correlated with higher incidence of a PCE
Case: PCE

• **Diagnostic Imaging:**
  - Echocardiography could demonstrate changes in pulmonary artery pressure and right ventricular dilation.
  - Chest X-ray and CT Scan
    - Maybe visualized as a large tubular, branching, or multiple small densities or opacities.

• **Presentation:**
  - Asymptomatic: found incidentally on imaging for another concern
  - Symptomatic: dyspnea or tachypnea, tachycardia, cyanosis, chest pain, coughing, hemoptysis, dizziness and sweating
Case: PCE

• Management:
  • Peripheral Cement Embolism:
    • Asymptomatic case:
      • Clinical follow-up
    • Symptomatic:
      • Example treatment plan:
        • 5000 units of heparin and IV push followed by 1000 units/h
        • Pt can be switched to warfarin or factor Xa inhibitors once stable
  • Central Cement Embolism:
    • Asymptomatic:
      • 5000 units of heparin and IV push followed by 1000 units/h
      • Pt can be switched to warfarin or factor Xa inhibitors once stable
    • Symptomatic:
      • Large embolisms can be retrieved using endovascular procedures under fluoroscopy
      • Trapped in the atrium may require emergent CV surgery
References:


