VASCULAR INJURY

<table>
<thead>
<tr>
<th>Definition</th>
<th>Pseudoaneurysm</th>
<th>Active Bleed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONTAINED Vascular Injury</td>
<td>NOT Contained</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Morphology - initial</th>
<th>Pseudoaneurysm</th>
<th>Active Bleed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round / Ovoid / Fusiform</td>
<td>Variable / Irregular Linear Components</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Morphology - delayed</th>
<th>Pseudoaneurysm</th>
<th>Active Bleed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Expansion</td>
<td>Expansion / Δ shape</td>
<td></td>
</tr>
</tbody>
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<tr>
<th>HU - initial</th>
<th>Pseudoaneurysm</th>
<th>Active Bleed</th>
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<tr>
<td>Similar to source vessel</td>
<td>Similar to source vessel</td>
<td></td>
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<th>HU - delayed</th>
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<tbody>
<tr>
<td>Washout</td>
<td>Persist / May Increase</td>
<td></td>
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Clinical Management

Treatment Options
- Conservative – Reassuication/Observation
- Aggressive - Surgery / IR Embolization

MULTIPLE CONSIDERATIONS
- Hemodynamics: Stable vs Unstable?
- Injuries: Severity, Location, Multiplicity
- Co-morbidities

Urgency [USUALLY]
- ACTIVE BLEEDING >> PSEUDOANUERYSM

IMAGE ANALYSIS - IDENTIFICATION

1. IDENTIFY THE VASCULAR INJURY
   – (High Attenuation Abnormality)

2. PITFALLS
   - Fracture Fragments
   - Foreign Body (bullet Fragments)
   - Calcifications
   - Other Contrast Extravasation
     - GI - Oral Contrast
     - GU - Excreted IV contrast
Lewis K. Shin, MD: MDCT of active arterial bleeding- what does it mean?

Pseudoaneurysm Mimic: Calcified Node

CONFIRM – Narrow Windows or Measure Hounsfield Units

IDENTIFY VESSEL

TX: SUCCESSFUL EMBOLIZATION LEFT GASTRIC BRANCHES

Portal Vein

Hx: Abdominal Pain

Hx: Abdominal Pain

3 MIN DELAY

ACTIVE BLEED (POST BIOPSY LYMPHOMA)

ABDOMINAL PAIN
MOTOR VEHICLE ACCIDENT 1 MONTH AGO.

HU = 238

HU = 224

HU = 400-500

3 MIN DELAY

CHARACTERIZE – VASCULAR INJURY: PSEUDOANUERYSM OR ACTIVE BLEED?
Lewis K. Shin, MD: MDCT of active arterial bleeding- what does it mean?

IDENTIFY ABNORMALITY

IDENTIFY VESSEL

IDENTIFY VESSEL

SOURCE VESSEL - Right Hepatic Artery

CHARACTERIZE

Right Hepatic Artery Pseudoaneurysm

Initial Scan Delayed Scan

Initial Scan Delayed Scan

Tx : Successful Embolization
EXTRAPERITONEAL BLADDER RUPTURE?

3 min Delay Initial

ACTIVE BLEED. EMBOLIZED. TRANSFERRED TO ICU. EXPIRED

3 min Delay Initial

OTHER CAUSES OF VASCULAR INJURY:
Hx: ACUTE ABDOMINAL PAIN

Stanford Radiology 10th Annual Multidetector CT Symposium
50 year old female with acute pain. Similar pain 5 previously.

Dx – AML with Pseudoanuerysm

Evidence of prior active bleeding (red arrow)

Hepatoma with Active Bleeding Tx Emergent Wedge Resection

Initial Delayed

3 min delay

50 year old female with acute pain. Similar pain 5 previously.

Dx – AML with Pseudoanuerysm.

day 2 – IR consulted
day 3 – Embolization without complications.

Evidence of prior active bleeding (red arrow)
Lewis K. Shin, MD: MDCT of active arterial bleeding - what does it mean?

May 13, 2008 - 4:20 PM

**ACTIVE BLEED CONFINED TO LIVER PARENCHYMA (INTRAHEPATIC ONLY)**

- Initial Scan 3 min 5 min
- Transfused and Observed in ICU
- Pt Recovered without Intervention

**OTHER SIGNS**

1. Shock Bowel
   a. Hyperenhancement of mucosa
   b. Reperfusion Phenomenon
2. Flat Cava
   a. If seen at multiple levels suggests intravascular volume depletion

**OTHER SIGNS**

Hematocrit Level Due to Anticoagulation. Active Bleeding with Contrast Settling Through Non-Clotted Hematoma

**SUMMARY**

1. IDENTIFY AND DIAGNOSE VASCULAR INJURIES ON MDCT (AVOID PITFALLS)
2. DIFFERENTIATE PSEUDOANUERYSM VS ACTIVE BLEEDING
3. LOOK FOR OTHER IMPORTANT CT SIGNS TO EVALUATE CLINICAL STATUS

THANK YOU FOR YOUR ATTENTION