MDCT of INTRAMURAL HEMATOMA

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Intramural Hematoma

Intramural hematoma (IMH)

aka

Atypical Dissection

aka

Noncommunicating Dissection
Intramural Hematoma

- CT Techniques
- Pathology and etiologies
- Demographics
- Imaging
- Natural history
- Follow-up imaging recommendations
- Treatment options
Intramural Hematoma

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MULTISLICE CT TECHNIQUES

- CT chest/abdomen/pelvis
- 64 slice
- Precontrast 5 mm q 5 mm
- Postcontrast scan 1.25 mm q 0.625 → use for 3D
- Postcontrast review 2.5 q 2.5
- 120 ml contrast 370 mgI/ml
- 50 ml saline chaser
- 4 ml/sec; right arm
- Triggered delay or test bolus
- Cardiac gating for chest portion
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Intramural Hematoma

Pathology
• Bleeding into the medial layer of the aortic wall

Etiologies
• Rupture of vasa vasorum due to degenerative changes in the media
  • Aging, hypertension, inflammation, aneurysm
  • Hereditary connective tissue diseases: Marfans, Ehlers-Danlos, familial forms
Intramural Hematoma

Etiologies

• Intimal tear with complete thrombosis of false lumen
  • Tear nonvisualized
  • Tear appears as ulcer-like projection
• Bleeding associated with penetrating atheromatous ulcer
• Rarely trauma

Baikoussis NG. J Cardiothor Surg 2009;4:54
Yoo SM. RCNA 2010;48:67
Intramural Hematoma

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Demographics

- Usually in older patients (except genetic syndromes)
- 53 - 84% of patients have hypertension
- Many patients have atherosclerosis with or without aneurysm
- Presentation: acute chest and/or back pain
- Uncommon: ~ 6-20% of acute aortic syndromes

Baikoussis NG. J Cardiothor Surg 2009;4:54
Chao CP. Radiographics 2009;29:791
Litmanovich D. AJR 2009;193:928
Svensson LG Ann Thor Surg 2008;85:S1
Intramural Hematoma

• More common in descending aorta vs ascending aorta

• Similar mortality to classical AD
  • 8% descending
  • 39% ascending

• Less likely to have malperfusion, pulse deficits, or aortic valve insufficiency than classical AD

Evangelista A. Circulation 2005;111:1063
Svensson LG Ann Thor Surg 2008;85:S1
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Diagnosis

• TEE sens 77-100%, spec 91-96% in ascending aorta
• MRI sens ~100%
  • Drawbacks: critically ill patients, emergent settings
• CT sens 99%, spec 100%

Baikoussis NG. J Cardiothor Surg 2009;4:54
Hayter RG. Radiology 2006;238:841
Intramural Hematoma

CT appearance

- Pre-contrast:
  - Crescentic or circumferential high attenuation in aortic wall
  - First 1-2 weeks after acute event
- Post-contrast: smooth, non-enhancing thickened aortic wall
- Displaced intimal calcifications

Chao CP. Radiographics 2009;29:791
IMH with intimal tear and ulcer-like projection

Yoo SM. RCNA 2010;48:67
Acute bleeding into aortic wall

Courtesy of Jay Faust, M.D.
Intramural hematoma and double barreled dissection*
Intramural hematoma and double barreled dissection*
<table>
<thead>
<tr>
<th>INTRAMURAL HEMATOMA</th>
<th>ATS &amp; INTRALUMINAL THROMBUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long segment</td>
<td>Shorter segment</td>
</tr>
<tr>
<td>Normal diameter ao</td>
<td>Aneurysmal aorta</td>
</tr>
<tr>
<td>Smooth interface</td>
<td>Irregular/lobulated interface</td>
</tr>
<tr>
<td>Displaced intimal calcification</td>
<td>No displaced intimal calcification</td>
</tr>
</tbody>
</table>
Intramural hematoma
ULCER-LIKE PROJECTIONS (ULPs) ASSOCIATED WITH IMH

- Intimal tear
- At presentation
- Developing later
- Penetrating atheromatous ulcer (PAU)
- Branch artery pseudoaneurysm
ULP: INTIMAL TEAR

- Smooth, regular outpouching
- No plaque at margins
ULP: PENETRATING AHEROMATOUS ULCER (PAU)

- Irregular, lobulated outpouching
- Calcified and noncalcified plaques
- Short segment hematoma (propagation may be limited by ATS)
IMH due to PAU
ULP: BRANCH ARTERY PSEUDOANEURYSM

• Small, isolated pocket of contrast
• Often no visible communication with TL
• Often from intercostal artery origin
• Dissection has sheared off artery at its origin
BRANCH ARTERY PSEUDOANEURYSM
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Natural history

• Resorption (common)
• Rupture through the intima into the aortic lumen: classical dissection (16-36%)
• Weakening of aortic wall with aneurysm formation (11%)
• Rupture outward into mediastinum (uncommon)
• New intimal tear with ulcer-like projection

Baikoussis NG. J Cardiothor Surg 2009;4:54
Bosma M. AJR 2009;193:895
Evangelista A. Circulation 2005;111:1063
Ide K. JTI 1996;11:46
Svensson LG Ann Thor Surg 2008;85:S1
↓ size of false lumen and ↑ true lumen

1 mo
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IMH → CLASSICAL DISSECTION

1 MO

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3 mos  2 mos
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False lumen rupture
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Natural History of ULPs Developing in IMH

• ~ 1/3 stable, decrease or resolve
• ~ 1/3 increase
• ~ 1/3 incorporate into expanded ao lumen
• ~10% require surgical repair

Bosma, Quint et al. AJR 2009;193:895-905
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Suggested follow-up imaging

• Weekly in first month
• Then 3, 6, 12 months
• Then yearly
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Treatment

• Beta blockers to reduce aortic wall stress and control hypertension
• Type A: controversial; usually surgery
• Type B:
  • Observation
  • Surgery (open or endovascular)
    • persistent or recurrent pain
    • aneurysm formation, ↑ hematoma, leaking
  • Endograft if intimal defect or leakage

Baikoussis NG. J Cardiothor Surg 2009;4:54
• Endograft for intimal tear and ruptured IMH
• 6 day interval
Conclusions

• IMH shows characteristic appearances at CT
• CT is an excellent modality for
  • Diagnosing
  • Following
  • Detecting complications