Aortic Dissection

Jennifer Buchanan, M.D.
UNC Morning Report
September 29, 2004
Pathophysiology

- Tear in aortic intima initiated by trauma or cystic medial necrosis.
- Passage of blood into aortic media, separating the intima from media/adventitia
- Creation of false lumen
- Propagation of tear which can lead to ischemia, aortic regurgitation, cardiac tamponade, etc.

VARIANTS: Intimal tear w/out hematoma
Aortic intramural hematoma
Predisposing Factors

- Hypertension (72%)
- Atherosclerosis (31%)

More Important in Patients Under 40:

- Preexisting aortic aneurysm
- Inflammatory dz. causing vasculitis (Takayasu or giant cell arteritis, RA, syphilitic aortitis).
- Collagen d/o’s (eg Marfan’s, Ehlers-Danlos, annuloaortic ectasia).
- Bicuspid aortic valve
- Aortic coarctation

- Turner syndrome
- CABG
- Prior aortic valve replacement
- Cardiac catheterization
- Trauma
- Weight-lifting
- Crack cocaine
Classification

• DeBakey System
  – Type I: involves ascending and descending thoracic aorta
  – Type II: ascending aorta only
  – Type III: descending aorta only

• Daily or Stanford System
  – Type A: involves ascending aorta (twice as common)
  – Type B: does not involve ascending aorta.
# Clinical Manifestations

<table>
<thead>
<tr>
<th>ASCENDING</th>
<th>DESCENDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain (79%), often anterior.</td>
<td>Posterior chest, back, or abd pain</td>
</tr>
<tr>
<td>Hypertension (36%)</td>
<td>Hypertension (70%)</td>
</tr>
<tr>
<td>Pulse deficit (20-30%); &gt;20mHg SBP variation between arms.</td>
<td>Pulse deficit (10-20%)</td>
</tr>
<tr>
<td>Syncope (worse outcome)</td>
<td>Migrating pain (25%)</td>
</tr>
<tr>
<td>AI, Acute MI, cardiac tamponade, exsanguination</td>
<td>Hypotension/shock (3%)</td>
</tr>
<tr>
<td>Stroke, Horner syndrome, Vocal cord paralysis</td>
<td>Spinal, splanchnic, or lower extremity ischemia, peripheral neuropathy</td>
</tr>
</tbody>
</table>
Diagnosis

96% of acute aortic dissections can be identified based upon combination of:

- Immediate onset of tearing/ripping “aortic” pain.
- Mediastinal/aortic widening on CXR
- Pulse deficit or arm SBP variation (>20mmHg)

Incidence of dissection: 7% when all 3 absent, 31-39% with either acute chest pain or CXR findings, >83% with BP/pulse differential or any combination of above variables.
Diagnosis (cont.)

• **CXR:** Mediastinal widening in 63% of Type A and 56% of Type B. Other findings – pleural effusion, widening of aortic contour, displaced calcification, aortic kinking.

• **EKG:** Not helpful in diagnosis, but allows identification of cardiac ischemia (related or unrelated to dissection). May show nonspecific ST and T wave changes or, in 5% of those w/ Type A dissections, acute MI.

• **Labs:** Minimal utility. LDH may be elevated secondary to hemolysis in false lumen, but is very nonspecific.

• **Other Imaging:** CT, MRI, echo, aortogram …
<table>
<thead>
<tr>
<th>STUDY</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEE</strong>&lt;br&gt;-multiplane&lt;br&gt;(sens 98%, spec 95%)</td>
<td>Superior visualization (of AI, intimal flap, lumens, coronary structures)&lt;br&gt;Portable, fast</td>
<td>Requires esophageal intubation&lt;br&gt;Not available everywhere</td>
<td>- Study of choice for unstable pts.</td>
</tr>
<tr>
<td><strong>MRI</strong>&lt;br&gt;(sens &amp; spec 98%)</td>
<td>Safer contrast&lt;br&gt;Site of entry seen in 85%&lt;br&gt;Better assesses branch vessels</td>
<td>Inconvenient&lt;br&gt;(less available, diff to monitor pts inside, mult restrictions to use)</td>
<td>- Stable pts.&lt;br&gt;- Chronic CP evaluation.&lt;br&gt;- Follow-up.</td>
</tr>
<tr>
<td><strong>CT Scan</strong>&lt;br&gt;(sens 83%, spec 100%)</td>
<td>Readily available.</td>
<td>Contrast&lt;br&gt;Site of entry rarely identified&lt;br&gt;Intimal flap seen &lt;75%&lt;br&gt;No eval for AI or coronary arteries</td>
<td>- If TEE, MRI unavailable or contra-indicated.</td>
</tr>
<tr>
<td><strong>Aortography</strong></td>
<td></td>
<td></td>
<td>- Rarely used.</td>
</tr>
</tbody>
</table>
Acute Management

• **BP control** - goal SBP 100-120 if tolerated
  – **Beta-Blocker** FIRST
  – **Nitroprusside** preferred if 2nd agent needed
    • Never use without B-blockade!
    • May also use ACE inhibitors, verapamil, diltiazem
  – Watch for hypotension
    • May be secondary to blood loss, tamponade, heart failure – eval for these prior to giving fluid.
    • Avoid inotropes b/c may increase shear stress and worsen dissection.

• **Pain control** (morphine)

• **IV access, follow H&H, creatinine, cardiac enzymes.**

• **Definitive Diagnostic Imaging**
Acute Management

Acute Management

- **ASCENDING AORTIC DISSECTION**
  - **Surgical emergency!** b/c
    - Because at high risk for life-threatening complications. Mortality 1-2% per hour early after symptom onset.
  - **Surgical repair:**
    - excision of intimal tear, obliteration of false lumen entry, aortic reconstitution w/ synthetic vascular graft.
    - Can repair or replace aortic valve if needed.
  - **Relative contraindication:** hemorrhagic stroke. Acute MI and old age are not contraindications.
  - **Operative mortality:** 7-36%.
  - **Long-term survival** after surgery: 68% - 5yr, 52% - 10yr
Acute Management

• DECENDING AORTIC DISSECTION
  – Medical therapy
    • For uncomplicated descending dissections.
    • Long-term survival: 60-80%-5yr, 40-45%-10yr
  – Surgical intervention
    • Only for those w/ Marfan’s or complications such as major aortic branch occlusion, ischemic symptoms, continued aortic expansion, extension of dissection, evidence of aortic rupture.
    • Long-term survival: similar to medical management, but increased short-term mortality.
  – Endovascular stent grafts
    • Increasingly larger role for unstable descending dissections or those with aortic branch obstruction, malperfusion syndrome. Limited mortality data.
Long-term Management
TYPE A AND B DISSECTIONS

• Close follow-up extremely important!
• Medical Therapy:
  – Beta-blocker + or - other agents.
    • Goal BP <135/85 or <130/80 in Marfan’s pts.
  – Avoidance of strenuous physical activity
• Routine Imaging:
  – Initial MRI, then repeat at 3,6, and 12 months; may decrease screening to every 1-2 years if no progression
  – Monitor for extension or recurrence of dissection, aneurysm formation, or anastomosis/stent leakage.
Long-term Management (cont)
TYPE A AND B DISSECTIONS

• Indications for Surgery
  – Required in approx. 30% within 5 years after initial presentation/surgical repair secondary to:
    • Graft dehiscence or infection (earlier)
    • Increase in aortic diameter
      – > 5.5 - 6cm for ascending aorta (> 5 - 5.5 for Marfan’s)
      – > 6cm for distal aorta
    • Aortic valve regurgitation
    • Extension or recurrence of dissection
    • Aneurysm formation (increased risk of rupture)
References

• UpToDate. “Clinical Manifestations and diagnosis of aortic dissection.”
• UpToDate. “Management of Aortic Dissection.”