Acute Limb Ischemia: A Lethal Disease

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No Relationships to Disclose
Acute Limb Ischemia

- Sudden obstruction in arterial flow to an extremity from embolism or thrombosis
- Embolism results in greater ischemia than thrombosis
- Location of occlusion critical
- Obtain good history
  - Duration of symptoms
  - Prior bypass, IC, etc
Etiology of Acute Limb Ischemia

• Embolic
  – Atrial fibrillation, LV thrombus
  – Prosthetic valve thromboembolism
  – Endocarditis, cardiac myxoma
  – Aortic atheroembolization, catheter-associated

• In Situ Thrombosis
  – Plaque rupture, stent or graft thrombosis
  – Aortic dissection
  – Popliteal aneurysm thrombosis
  – Hypercoagulable states (APL syndrome, malignancy)
  – Iatrogenic (catheter-induced dissection, VCD injury)
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Motor and Sensory Findings</th>
<th>Arterial Doppler Signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Viable)</td>
<td>Not immediately threatened</td>
<td>None</td>
<td>Audible</td>
</tr>
<tr>
<td>IIa (Marginally threatened)</td>
<td>Salvageable if promptly treated</td>
<td>Minimal sensory defect (toes) or none</td>
<td>Often inaudible</td>
</tr>
<tr>
<td>IIb (Immediately threatened)</td>
<td>Salvageable with immediate revascularization</td>
<td>Mild, moderate weakness; sensory deficit extends to beyond toes, associated with rest pain</td>
<td>Usually inaudible</td>
</tr>
<tr>
<td>III</td>
<td>Major tissue loss or permanent nerve damage inevitable</td>
<td>Profound motor paralysis with extensive sensory deficits</td>
<td>Inaudible, venous sounds also absent</td>
</tr>
</tbody>
</table>
Managing Acute Limb Ischemia

- Anticoagulation with heparin
- Analgesia
- Improve foot perfusion
  - Keep foot dependant
  - Avoid pressure over heel
  - Avoid temperature extremes
  - Oxygen
  - Correct hypotension
- Consider ultrasound
- Urgent revascularization (surgical, endo, or both)
- Consider fasciotomy
Trends in Acute Limb Ischemia

- Medicare claims data 1998 – 2009
- Hospitalization decreased
- Surgery decreased
- Endovascular therapy increased
- In-hospital mortality decreased
- 1-year amputation rates decreased
- 1-year mortality (≈42%)
Decreasing Rate of ALI 1998 – 2009
Amputation Rates ALI
Amputation-free Survival for ALI
Surgical Bypass for ALI

- VSGNE 323 / 5712 lower extremity bypasses for ALI
- Groups well-matched
- ALI patients more likely to have
  - Prior ipsilateral bypass (33 vs 24%, p = 0.004))
  - Prior ipsilateral endo procedure (41 vs 29%, p = 0.001)
- Bypass procedures in ALI patients were
  - Longer in duration (270 vs 244 min)
  - Greater blood loss (363 vs 272 ml)
  - More commonly utilized prosthetic conduit (41 vs 33%)
- Higher complication rate for ALI
<table>
<thead>
<tr>
<th>Variable</th>
<th>Bypass for ALI (%)</th>
<th>All other bypasses (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta blocker</td>
<td>71</td>
<td>77</td>
<td>0.023</td>
</tr>
<tr>
<td>ASA usage</td>
<td>62</td>
<td>75</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Statin usage</td>
<td>55</td>
<td>68</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any in-hospital major event</td>
<td>19.8</td>
<td>11.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>7.5</td>
<td>3.6</td>
<td>0.001</td>
</tr>
<tr>
<td>Decr in renal function</td>
<td>6.6</td>
<td>4.4</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Surgical Bypass for ALI

![Graph showing proportion of patients alive with an intact limb over months of follow-up for patients with and without acute limb ischemia. The graph includes a table with number at risk by group: No ALI (5387, 3355, 2764, 2184, 1263) and ALI (322, 143, 124, 93, 56).]
Endo vs Surgical Bypass for ALI

- Consecutive patients treated for ALI 2005 - 2011
- Endo (n = 154 limbs), Surgery (n = 326 limbs)
- Rutherford II ischemia for Surgery (83%) for Endo (90%)
- Surgery patients older, more afib, CABG, CKD
- Mean follow-up was 14 ± 18.5 months
- Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Surgery</th>
<th>Endo</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success</td>
<td>90.7%</td>
<td>79.9%</td>
<td>0.002</td>
</tr>
<tr>
<td>30-day amp</td>
<td>10.0%</td>
<td>7.2%</td>
<td>NS</td>
</tr>
<tr>
<td>1-year amp</td>
<td>16.3%</td>
<td>13.0%</td>
<td>NS</td>
</tr>
</tbody>
</table>
Endo vs Surgical Bypass for ALI
Endo vs Surgical Bypass for ALI
# Predictors of Mortality


<table>
<thead>
<tr>
<th>Variable</th>
<th>HR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.03</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cancer</td>
<td>1.65</td>
<td>0.005</td>
</tr>
<tr>
<td>ESRD/dialysis</td>
<td>7.28</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COPD</td>
<td>1.61</td>
<td>0.005</td>
</tr>
<tr>
<td>Category II Ischemia</td>
<td>8.00</td>
<td>0.047</td>
</tr>
<tr>
<td>Category III Ischemia</td>
<td>38.67</td>
<td>0.001</td>
</tr>
</tbody>
</table>
Conclusions: Acute Limb Ischemia

• Early diagnosis key
• High rate of loss of limb and life
• Treatment individualized
  – Consider endo first if sensory changes
  – Consider surgery first if motor changes
Case Study: Acute Limb Ischemia

- 45 yo presents with acute RCA occlusion. PCI with bare-metal stent via right femoral artery.
- Transferred to CCU at 05:00 with arterial and venous sheaths
- Sheaths removed at 11:30, manual compression applied for 15 min, small hematoma noted at groin site
- Patient complains of right leg pain at 15:00
- Next step?
5 Ps of Acute Limb Ischemia

• Pain
• Pallor
• Pulselessness – check pulses, capillary refill time
• Paresthesia – Light touch, proprioception and vibration are lost first followed by deep pain and pressure
• Paralysis – intrinsic foot muscles are affected first followed by leg muscles
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