Catheter-Directed Thrombolysis for Acute Limb Ischemia

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Disclosure

Speaker name: Hwan Jun Jae

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Acute Limb Ischemia

- Acute limb ischemia (ALI)
  - Sudden decrease in limb perfusion that threatens limb viability

- Treatment options
  - Endovascular therapy
    - Catheter directed thrombolysis
    - Aspiration thrombectomy
    - Mechanical thrombectomy
    - PTA/Stent
  - Surgery
Assess limb viability and potential for salvage.

Stage I, II: Endovascular Tx.

Limbs in need of immediate revascularization are best treated with surgery.

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**Table 1. Stages of Acute Limb Ischemia.*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description and Prognosis</th>
<th>Findings</th>
<th>Doppler Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Limb viable, not immediately threatened</td>
<td>Sensory Loss: None</td>
<td>Muscle Weakness: None</td>
</tr>
<tr>
<td>II</td>
<td>Limb threatened</td>
<td>Minimal (toes) or none</td>
<td>None</td>
</tr>
<tr>
<td>IIa</td>
<td>Marginally threatened, salvageable if promptly treated</td>
<td>More than toes, associated with pain at rest</td>
<td>Mild or moderate</td>
</tr>
<tr>
<td>IIb</td>
<td>Immediately threatened, salvageable with immediate revascularization</td>
<td>Profound, anesthetic</td>
<td>Profound, paralysis (rigor)</td>
</tr>
<tr>
<td>III</td>
<td>Limb irreversibly damaged, major tissue loss or permanent nerve damage inevitable</td>
<td></td>
<td>Inaudible</td>
</tr>
</tbody>
</table>

*Data are from the Society for Vascular Surgery standards.⁴

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* Rutherford classification of acute limb ischemia as a guideline for intervention

Creager MA et al. NEJM 2012
Endovascular Revascularization

• Goal
  – Restore blood flow as rapidly as possible with thrombolytics, mechanical devices, or both.

• Contraindication
  – Nonviable limb
  – Bypass graft with suspected infection
  – Contraindication to thrombolysis
    • recent intracranial hemorrhage
    • recent major surgery
    • active bleeding
    • vascular brain neoplasm
Catheter-Directed Thrombolysis

• Techniques
  – **Micropuncture** under US guidance.
    • single needle puncture is important to minimize hemorrhagic complication at the puncture site
  – **Angiography**
    • to assess the *inflow and outflow* arteries and the nature and length of thrombosis.
  – Cross the occlusion with a guidewire.
Catheter-Directed Thrombolysis

• Techniques
  – Multi–side-hole catheter
    • direct delivery of the thrombolytic agent into the thrombus
    • Low dose continuous infusion of thrombolytics
      – Urokinase
      – Alteplase
      – Reteplase
      – Tenecteplase
  – Concomitant heparin
    • to prevent the formation of pericatheter thrombus
    • Subtherapeutic heparin is infused at 500 units/h through the side arm of the sheath

- Check aPTT, fibrinogen level every 8 hours
Catheter-Directed Thrombolysis: Outcomes

- Complete or partial thrombus resolution with a satisfactory clinical result after catheter-based thrombolysis: 75-92%
  
  *Earnshaw JJ et al. JVS 2004*
  *Razavi MK et al. JVIR 2003*

- Major hemorrhage: 6-9%
  - including ICH in less than 3%
  
  *Van Den Berg JC et al. JVS 2010*
F/69 Sudden Rt. Lower leg pain (3DA)

Embolic occlusion of Rt. ATA and peroneal a.

Delayed and limited perfusion in the Rt. foot
Guidewire passage

Multi–side-hole catheter

Overnight UK infusion

UK 50,000 IU/hour

Heparin 500 IU/hour
In the next day, after overnight UK infusion

Revascularization of Rt. ATA and peroneal a.
F/80
Coldness and pain in the Rt lower leg, since 3DA
Rt CIA near complete occlusion

Thromboembolism, Rt Popliteal a. & tibioperoneal trunk
For rapid improvement of Rt. L/E perfusion

Balloon expandable stent 8mm x 37mm
Overnight UK infusion: 60,000 unit / hour
In the next day, after overnight UK infusion
F/74  Color change of Lt. L/E since 1DA
- Large LA thrombus with atrial fibrillation
- s/p MVR
- DM ESRD
- Aspiration pneumonia
Extensive Thromboembolism, Both L/E
Extensive Thromboembolism, Both L/E
Distal perfusion was not good. RT < LT
6 F curved sheath

Aspiration thrombectomy with 6F envoy catheter

Overnight UK infusion
• UK 80,000 unit/hr via catheter
• heparin 500 unit/hr via sheath
Aspiration thrombectomy
UK infusion: 60,000 unit/hr
Residual thrombus in the popliteal a.  
Aspiration thrombectomy
Summary

• In patients with ALI, the revascularization strategy should be determined by local resources and patient factors.

• Catheter-directed thrombolysis is effective for ALI patients with salvageable limb.

• Aspiration thrombectomy or stenting can be useful as adjunctive therapy to thrombolysis.
Thank you for your attention!
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