Thrombolysis in Critical Limb Ischemia

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Disclosures

Sadly-None
What are the Goals of Thrombolysis

The Goals of Thrombolysis are to remove the thromboemboli responsible for obstructing the vessel.

Why do arteries thrombose?
Who do we intervene on?
Who should we not?
What lytic and dosing are most appropriate?
What additional therapies will help maintain the result.
In What Situations Do Arteries Thrombose?

Bypass Grafts

Unfortunately, many bypass grafts don’t last forever. When they occlude, it is often sudden, distal emboli are common and collateral flow has little time to establish. A common recipe for CLI. Grafts often occlude as a result of worsening outflow disease, creating stasis in the graft.
Other Causes of Arterial Thrombosis

- Low CO states
- Arterial compression, external, substance abusers or injection
- Cardiac emboli-afib/paradoxical
- Atherosclerotic emboli- AAA, Plaque Rupture
- Vasculitis, FMD, popliteal compression
- Subclavian and axillary compression in athletes
- Hypercoagulability states

- Iatrogenic complications
  - Sheath obstruction
  - Closure device complication
  - Incomplete lesion/stent area

- Often these causes are in combination.
Who do we intervene on?

- Timing-less than 24 hours is optimal. Often there is less success in using thrombolysis if thrombus more than 14 days old but this is not a hard rule.

- Let your wire decide

- Severity of ischemia-6 “p”s

  - Pain
  - Pallor
  - Pulselessness-(lack of doppler)
  - Poikilothermia
  - Paresthesia
  - Paralysis

- If patient is fully anesthetic and paralyzed, it is often too late to save the limb.

<table>
<thead>
<tr>
<th>Category</th>
<th>Capillary Return</th>
<th>Muscle paralysis</th>
<th>Sensory loss</th>
<th>Artery doppler</th>
<th>Venous Doppler</th>
<th>Chance of Salvage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viable</td>
<td>Normal</td>
<td>None</td>
<td>None</td>
<td>Audible</td>
<td>Audible</td>
<td>Excellent</td>
</tr>
<tr>
<td>Threatened</td>
<td>Normal/Slow</td>
<td>None</td>
<td>Partial</td>
<td>Weak</td>
<td>Audible</td>
<td>Good</td>
</tr>
<tr>
<td>Severely Threatened</td>
<td>Slow/Absent</td>
<td>Partial</td>
<td>Partial</td>
<td>Inaudible</td>
<td>Audible</td>
<td>Fair</td>
</tr>
<tr>
<td>Irreversible</td>
<td>Absent</td>
<td>Complete</td>
<td>Complete</td>
<td>Inaudible</td>
<td>Inaudible</td>
<td>Poor</td>
</tr>
</tbody>
</table>
Who do we not intervene on?

Absolute contraindications-
CVA/TIA in last 2 months
Active bleeding
Recent GI bleeding-last 10 days
Neurosurgery in last 3 months
Intracranial trauma in last 3 months

Relative contraindications
CPR in last 10 days
Major non vascular surgery or trauma in last 10 days
Uncontrolled htn >180/110
Puncture of non compressible vessel
Intracranial tumor
Recent eye surgery
Who do we not intervene on?

- Consider shorter lytic exposure in the elderly >75 to limit ICH risk. (PEITHO trial)
What lytics are most appropriate

Fibrin specific:
Alteplase-TPA-naturally occurring, Half-life 6-10 minutes.
Reteplase r-PA-least fibrin specific, dissolves into clot better. Produced by ecoli. Half-life 13-16 minutes.
Tenecteplase TNK-most fibrin specific, half life 20-130 minutes. ASSENT 2- vs TPA, 5.9 vs 4.6% major bleeding.
Pro-Urokinase- in trials, but probably not significantly more effective than Urokinase, less antigen activity.

Non Fibrin Specific:
Streptokinase, 1st fibrinolytic 1933 from Beta-hemolytic strep, least expensive, antigenic activity common.
Urokinase-Human Urine 1500 liters/dose and ecoli. Half life 20 minutes.
APSAC-Streptokinase and plasminogen, antigenic. Half-life 40-90 minutes.
What Dosages are used.

• Retaplace 0.5 U/h
• Alteplase 0.05-0.1 mg/kg/hr, usually 1-2 mg/hr.
• Urokinase 4000 U/min for 4 hours then 1000-2000 U/min. Topas trial, phase 1- 71% complete lysis with average 23 hour infusion.
• Streptokinase 5000-10,000 U/hr.
Techniques for thrombolysis

- Systemic infusion-no longer used
- Intra artery infusion-catheter not across thrombus.
- Intrathrombus infusion-multiholed catheter delivering med throughout thrombus.
  - Bolusing/lacing followed by continuous infusion.
  - Graded infusion- initially higher dose.
  - Power Pulse-force injection into thrombus and mechanical disruption to increase surface area in contact with med.
- Pharmacomechanical thrombolysis- The use of Jet spray catheter with Venturi effect to remove softened treated thrombus.
- Ultrasound directed-Small trials have not shown a clear benefit over CDT. (JVIR August 2014, 1149-56)
- Trellis Catheter
- Clearway balloon
65 yo female with acute graft closure
65 y o female with graft closure
65 yo with acute graft closure
65 yo with acute graft closure
Thank You
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