Tips and Tricks for Tibial Intervention

Donald L. Jacobs, MD
C Rollins Hanlon Endowed Professor and Chair
Chair of Surgery
Saint Louis University
SSM-STL Saint Louis University Hospital

Tibial intervention overview

- Lesion/vessel selection
  - Multivessel/single vessel
  - Angiosome directed
- Tibial lesion crossing
  - Wires, catheters, retrograde
- Tibial angioplasty
  - Standard or specialty balloons
- Tibial stenting

Disclosures

- Abbott – consultant and proctor
- Spectranetics – contract research

Failure despite attempt to find best target for bypass or PTA in patients with CLI

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedure</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodney at al</td>
<td>Bypass</td>
<td>2306</td>
</tr>
<tr>
<td>Ann Vasc Surg 2010;24:59</td>
<td>8% amputation at one year</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>17% of these had a patent bypass</td>
</tr>
<tr>
<td>Simons et al.</td>
<td>Bypass</td>
<td>1012</td>
</tr>
<tr>
<td>J Vasc Surg 2010;51:1419</td>
<td>10% clinical failure despite a patent graft</td>
<td></td>
</tr>
<tr>
<td>Taylor et al.</td>
<td>PTA</td>
<td>362</td>
</tr>
<tr>
<td>J Vasc Surg 2009;50:534</td>
<td>44% of bypass patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>316</td>
</tr>
<tr>
<td></td>
<td>37% of PTA patients</td>
<td></td>
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<tr>
<td></td>
<td>Achieved composite endpoint of survival + limb salvage + ambulation at one year</td>
<td></td>
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Angiosomes of the Foot

<table>
<thead>
<tr>
<th>Method of distal Revascularization</th>
<th>Direct Angiosome Revascularization</th>
<th>Non-Direct Angiosome Revascularization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endovascular</td>
<td>83% healed</td>
<td>59% healed</td>
</tr>
<tr>
<td>Neville et al.</td>
<td>91% healed</td>
<td>62% healed</td>
</tr>
</tbody>
</table>

Ischemic 1st toe ulcer
Treated with anterior tibial artery angioplasty

Ischemic 5th toe ulcer
Treated with lateral plantar artery angioplasty
When is Angiosome concept less (un)important?

- Rest pain only with no tissue loss
  - Rutherford 4
- Tissue loss is above the ankle
- Superficial ulceration, <10mm in diameter
  - Particularly with a toe pressure >50mmHg
- Non-diabetics
  - Typically have better cross collaterals in the foot than diabetics
- Fully intact pedal arch

Tibial Intervention: access site, wires and support

- Contralateral vs ipsilateral antegrade access
  - Need support for occlusions
  - Contralateral requires larger as well as longer sheath for equivalent support
    - Antegrade 5 or 6 French 30-55cm long sheath
    - Contralateral femoral 6 or 7 French 70 to 90cm long sheath
  - Coaxial support catheters critical
  - Angled catheter may be useful for tibial origin selection but angle is not good for crossing tibial lesions

- Stenoses best crossed with 014 wires
  - Hydrophilic coated tips best in most cases
  - Catheter or balloon support is useful
    - Manipulation can easily deform wire tip
    - Support catheter allows for wire curve control
  - Total occlusions best crossed with 018 wires
    - Hydrophilic coated best
    - Support catheter or balloon support essential in occlusions
      - Catheter limits need for special crossing tipped wires
  - Perforation or failure to cross occlusions
    - Retrograde access is the bailout

Retrograde Tibial access technique

- Stabilize foot with tape
- Cut drape and use clear adhesive dressing cover to stabilize opening to the leg
- Micropuncture access setup
- Have nitro available for injection from proximal access catheter
**Ultrasound Guided Tibial Access**

- Easy to image in distal anterior tibial, dorsalis pedis, or distal posterior tibial artery
- Not the choice for peroneal access
  - Local anesthetic placed with ultrasound guidance
  - Nitro from above to relieve spasm
  - Access ultrasound reflective needle
  - 24 Gauge needle with 0.018 wire

**Angiographic Guided Tibial Access**

- Rotate beam so as to have the skin entry site directly in the plane of the artery
- Mag view with collimation
- Raise Image Intensifier high enough to allow ease of access with needle at appropriate angle
- Pass needle under flouro and have assistant watch for blood return
- Use rotated 90 deg. view to see depth of needle relative to the artery

**Tibial Access Technique**

- No sheath in tibial access needed routinely
  - 018 wire and support catheter alone is 1st choice
- The more proximal vessel occlusions often require crossing dissection plane from above and below
  - Meet in the middle but not in the same plane
  - PTA from above to disrupt and create connection
  - May require double balloon technique
    - Low profile from below through a 4 Fr sheath
Capture of the wire

- Wire can be manipulated directly into proximal catheter or the sheath
- Wire can be snared and pulled out the femoral sheath
- Wire can be threaded into a dedicated capture catheter and out the femoral sheath

Distal access site management after successful crossing and treatment

- Tibial balloon advanced from above to just proximal to the distal access site
- Remove through and through wire
- Cross distal to the distal access with 014 wire
- Remove the distal access catheter
- Advance and inflate balloon for hemostatic control and to treat local spasm from access
- Manual compression or inflate a BP cuff on the distal access site for hemostasis may occasionally be required
Non healing ulcers for several months
### Tibial angioplasty for CLI

<table>
<thead>
<tr>
<th>Author</th>
<th>Limbs Treated</th>
<th>Procedural Success</th>
<th>Limb Salvage at 24 months</th>
</tr>
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<tbody>
<tr>
<td>Lofberg</td>
<td>86</td>
<td>88%</td>
<td>75%</td>
</tr>
<tr>
<td>Bull</td>
<td>168</td>
<td>100%</td>
<td>85%</td>
</tr>
<tr>
<td>Brown</td>
<td>55</td>
<td>95%</td>
<td>53%</td>
</tr>
<tr>
<td>Parsons</td>
<td>66</td>
<td>90%</td>
<td>25%</td>
</tr>
<tr>
<td>Matsi</td>
<td>117</td>
<td>89%</td>
<td>49%</td>
</tr>
</tbody>
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### Tibial PTA
Alternative tibial angioplasty tools

- Plaque modifying balloon angioplasty
  - Cutting balloon
  - Scoring balloon
  - Focus force balloon
- Particularly useful in selected situations
  - Short lesions
  - Calcified lesions
  - Ostial lesions

Tibial DES results

- Results at 2 years
  - 73% patency
  - 90% limb salvage,
  - 35% mortality

McMillian et al, J Vasc Interventional Radiol. 21(12): 1825-29, 2010

Tibial stenting

- Coronary drug eluting stents are best
  - DES patency better than bare metal stents
  - Coronary sizes appropriate
  - Typically spot stenting is effective
  - Concern about compression of balloon expandable stents not warranted
    - except in distal 3rd of PT and AT tibial arteries were the vessels are superficial enough to be susceptible