When is below the ankle angioplasty indicated and how to introduce it into your practice?

Peter A. Schneider, MD
Kaiser Foundation Hospital
Honolulu, Hawaii
Disclosure

Peter A. Schneider

Potential conflicts of interest to report:

Enter patients in studies sponsored by: Gore, Cordis, Medtronic, Silk Road, Bard, NIH, Limflow

Modest royalty: Cook

Scientific Advisory Board (non-compensated): Abbott, Medtronic, Boston Scientific

Chief Medical Officer: Intact Vascular, Cagent
When and how to do below the ankle angioplasty?

BTA Angioplasty

One area where endo has a potential advantage over bypass. Need solutions in diabetics with compartmentalized pedal perfusion.
BTA Angioplasty
58 year old diabetic on dialysis

Short occlusion of common plantar
Figure 2. Definition of pedal artery disease was based on the Kawarada classification system. Type 1—both dorsal and lateral plantar arteries were patent; type 2—either the dorsal (2A) or lateral plantar (2B) artery was opened; type 3—both the dorsal and lateral plantar arteries were occluded. Of these, types 2 and 3 were defined as pedal artery disease for purposes of the study.
BTA Angioplasty Technique

• Antegrade ipsilateral approach
• 014 wire
• Wire choice: Fielder, Command
• CTO/support catheter-CXI angled tip
• Transluminal vs subintimal
• Value of plantar flexion (AT) and dorsiflexion (PT)

Courtesy: L Graziani
Pre-treatment Imaging
BTA Angioplasty and Stenting

<table>
<thead>
<tr>
<th>Estimated survival outcome</th>
<th>All BTA lesions (n = 42)</th>
<th>Plain balloon angioplasty (n = 23)</th>
<th>Balloon-expandable metal DES (n = 11)</th>
<th>Self-expanding bare metal stents (n = 8)</th>
<th>p^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary vessel patency rate</td>
<td>50.4 ± 9.1</td>
<td>63.6 ± 12.1</td>
<td>61.4 ± 15.3</td>
<td>0.0 ± 0.0</td>
<td>0.005^b, 0.048^c</td>
</tr>
<tr>
<td>In-lesion binary restenosis rate</td>
<td>64.1 ± 8.3</td>
<td>66.0 ± 11.2</td>
<td>50.0 ± 15.8</td>
<td>100.0 ± 0.0</td>
<td>0.061^b, 0.058^c</td>
</tr>
<tr>
<td>Reintervention-free survival</td>
<td>93.6 ± 4.3</td>
<td>93.3 ± 6.4</td>
<td>100.0 ± 0.0</td>
<td>80.0 ± 17.9</td>
<td>0.960^b, 0.654^c</td>
</tr>
</tbody>
</table>

**Table:**
- **Characteristic**
  - CLI limbs (n)
  - Concomitant femoropopliteal disease: 37/40 (92.5 %)
  - Concomitant infrapopliteal disease: 38/40 (95.0 %)
  - Isolated inframalleolar disease: 2/40 (5.0 %)
  - BTA lesions treated (n): 42
  - Lesion anatomy
    - Dorsalis pedis artery: 28/42 (66.7 %)
    - Inframalleolar posterior tibial–plantar arteries: 14/42 (33.3 %)
  - Chronic total occlusion: 15/42 (35.7 %)
  - Lesion calcification: 30/42 (71.4 %)
  - Treated lesion length (cm): 4.2 ± 1.4 (1.0–10.0)
  - Provisional stenting: 19/42 (45.2 %)
Below-the-ankle Angioplasty and Stenting for Limb Salvage: Anatomical Considerations and Long-term Outcomes

Future: Focal dissection repair

4F Tack deployed
distal plantar artery

Tacks placed in lateral plantar artery

Conflict: Co-Founder and Chief Medical Officer for Intact Vascular
BTA Angioplasty

![Graph showing cumulative rates of limb salvage, patient survival, and amputation-free survival over time (days).](image)

<table>
<thead>
<tr>
<th>Months</th>
<th>6</th>
<th>12</th>
<th>24</th>
<th>36</th>
<th>48</th>
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<tbody>
<tr>
<td>No. at risk</td>
<td>32</td>
<td>32</td>
<td>24</td>
<td>27</td>
<td>32</td>
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<tr>
<td>Reintervention free</td>
<td>12</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Amputation free survival</td>
<td>32</td>
<td>27</td>
<td>9</td>
<td>3</td>
<td>1</td>
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<tr>
<td>Patient survival</td>
<td>24</td>
<td>24</td>
<td>9</td>
<td>4</td>
<td>1</td>
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<tr>
<td>Limb salvage</td>
<td>32</td>
<td>27</td>
<td>9</td>
<td>3</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Rate (%)</th>
<th>Reintervention free</th>
<th>Amputation free survival</th>
<th>Patient survival</th>
<th>Limb salvage</th>
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<tr>
<td>6</td>
<td>39.6</td>
<td>80</td>
<td>77.4</td>
<td>94.7</td>
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Figure 3 ◆ Classification of below movements. D-1: proximal to talonavicular joint, talonavicular joint to navicular cuneiform joint, navicular cuneiform joint to cuneal joint, D-4: distal to cuneiform navicular cuneiform joint to talonavicular joint, D-3: proximal to the upper edge of calcaneus to lower edge of calcaneus. Note calcified vessels (arrows).
The rate of wound healing was significantly higher (59.3% vs. 38.1%; p = 0.003) and time to wound healing significantly shorter (median 211 days [interquartile range: 69.25 to 365 days] vs. 365 days [interquartile range: 86.5 to 365 days], p = 0.008) in the pedal artery angioplasty (PAA) group compared with the non-PAA group (standard errors did not exceed 10%).
45 patients with both BTK and BTA disease

When BTA angioplasty also performed; trend toward better patency and fewer amputations.

BTA Angioplasty

Challenges

Marginal hemodynamic results, difficult to assess, no viable bailout
Long segment tibial disease that extends into the foot seems to be worse than focal pedal vessel lesions.
BTA Angioplasty
Conclusion

• Less hesitation but field not fully formed.
• Technically possible in many/most cases.
• May provide faster wound healing.
• Patency unclear.

• Consider BTA angioplasty when:
  – Only outflow to foot is severely diseased
  – Pedal artery supplies wound related artery
  – Lesion beyond the reach of bypass
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